AVIATION WEEK

JUNE 22, 1953

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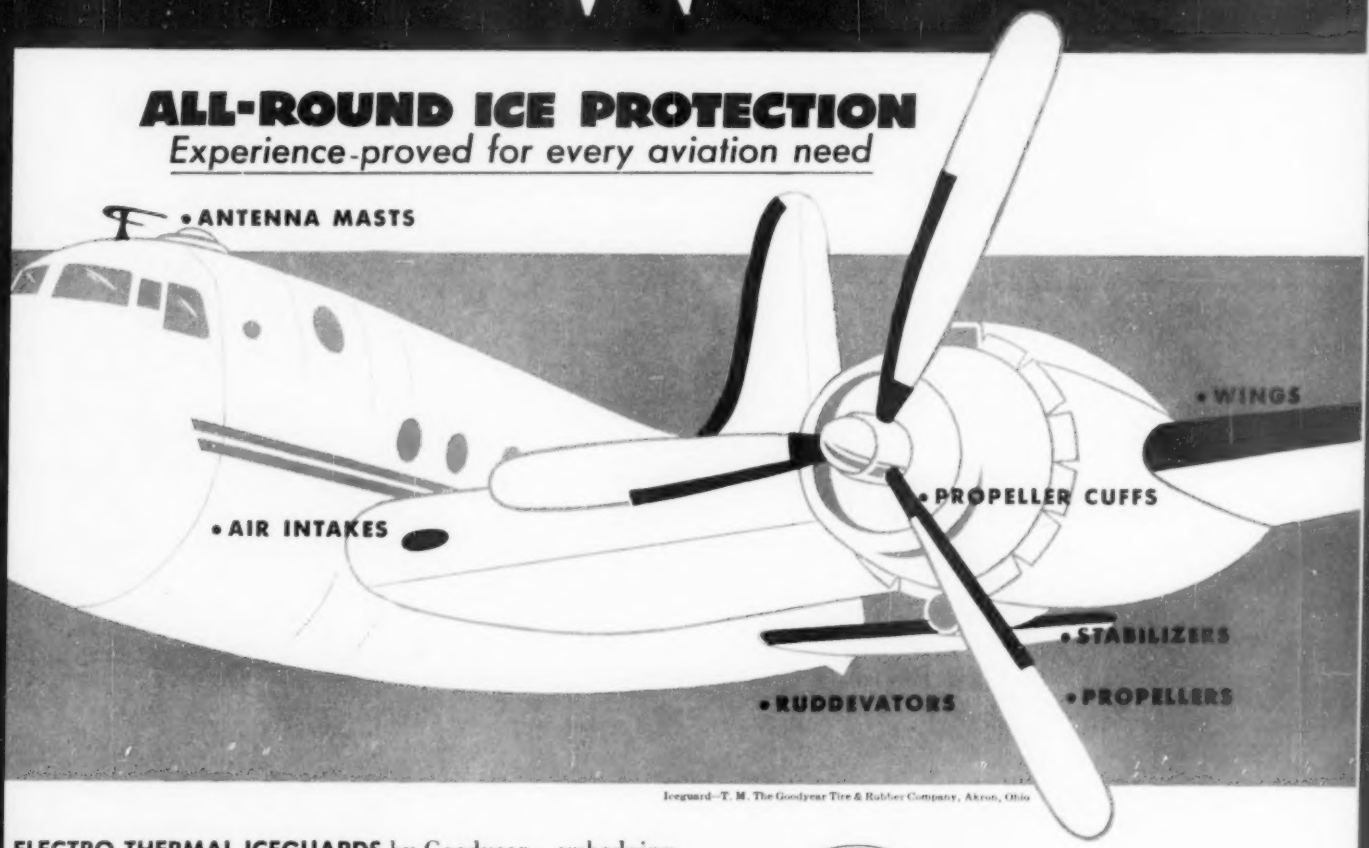

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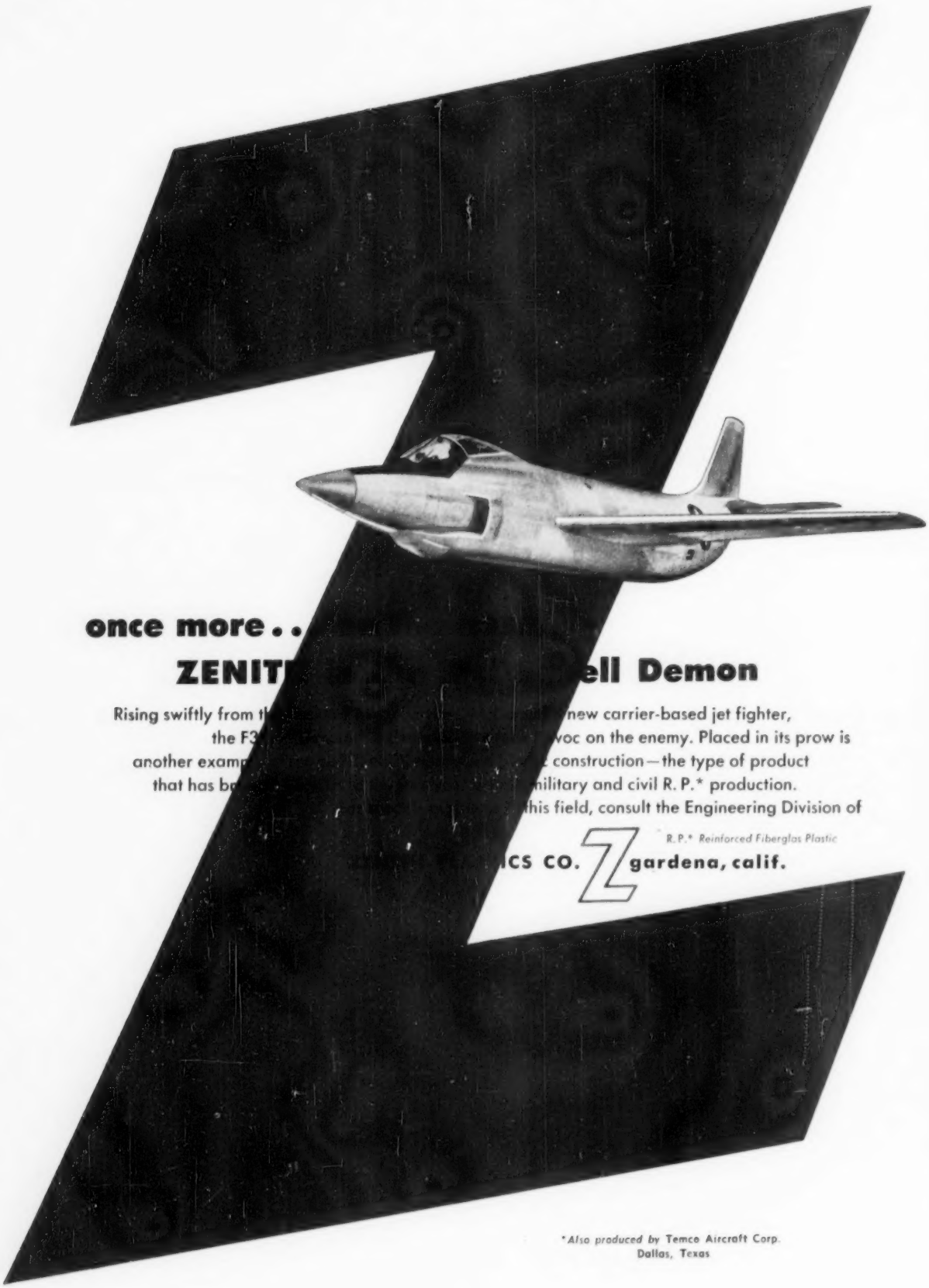

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Table of Contents on Page 8

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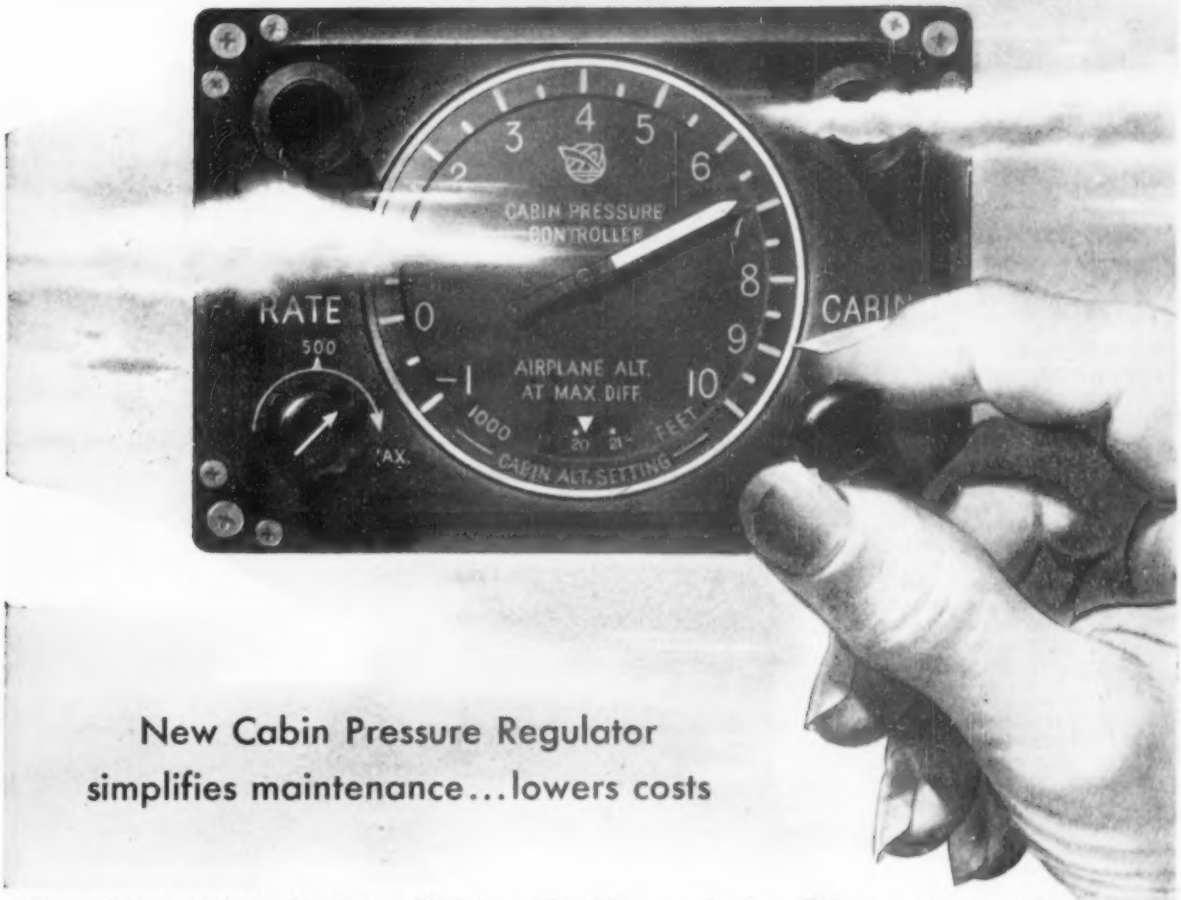
What's New at AiResearch



New Cabin Pressure Regulator simplifies maintenance... lowers costs

Since AiResearch built the *first* Cabin Pressure Regulator for the Boeing B-29, this company has energetically pursued a research and development program to improve and simplify this vital Cabin Pressure Control.

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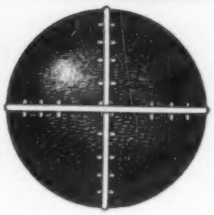

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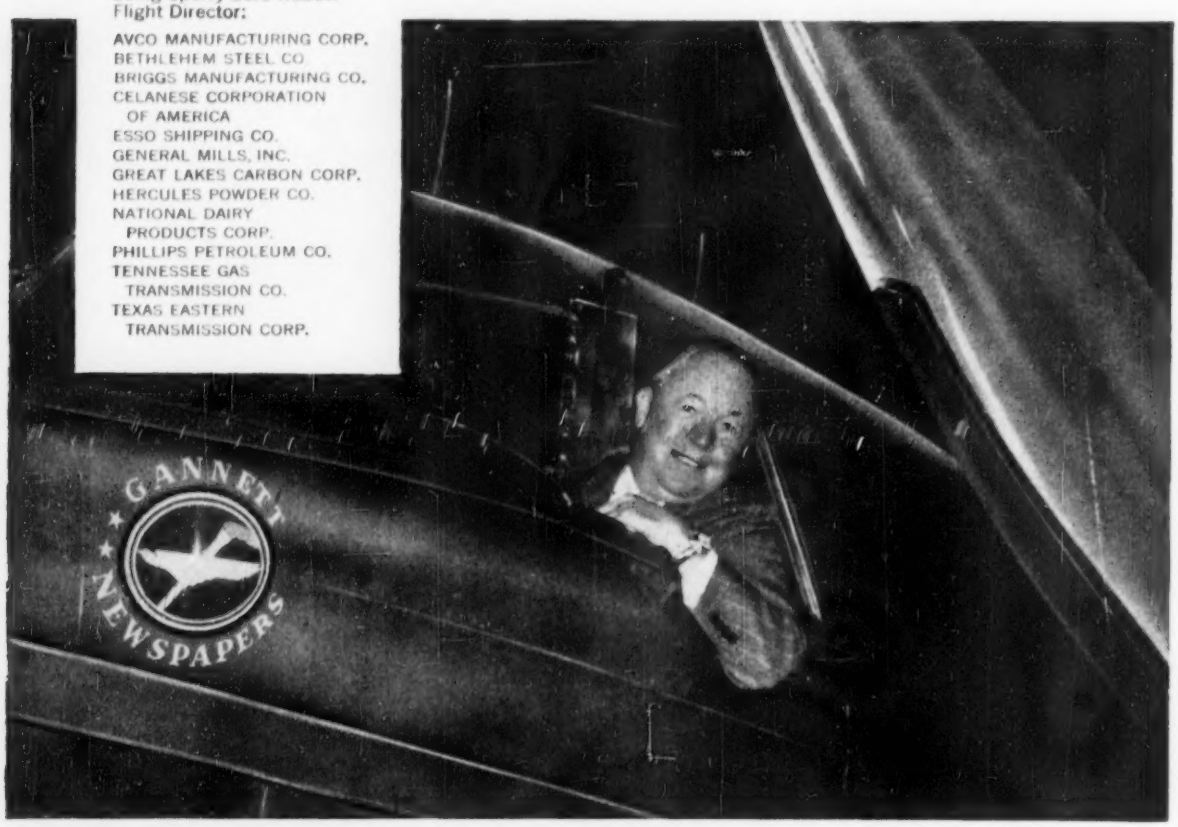

Cmdr. Russell Holderman of the Gannett Newspapers, who is celebrating his 40th year as a pilot, is one of the enthusiastic users of the Sperry Zero Reader Flight Director.

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NEWS DIGEST

Domestic

Aircraft industry has formed an 11-man advisory committee on equipment cooling systems to aid USAF's Air Research and Development Command in overcoming the temperature barrier encountered at supersonic speeds.

New constant-speed prop in 145-350-hp. range is slated for production this month by McCauley Industrial Corp., Dayton. Met-L-Matic prop features a completely sealed pitch-changing mechanism and forged aluminum alloy hub. Counterweights are not used. Other models will have provision for reverse pitch and inflight feathering and unfeathering.

Douglas DC-6C is a new convertible cargo-coach airliner announced last week. Designed for 107,000-lb. takeoff weight and 320-mph. cruise speed, the DC-6C coach version would seat 76 passengers and baggage plus 2,400 lb. cargo. All-cargo model could haul nearly 13 tons. No firm DC-6C orders have been revealed.

Air Force C-124s in Japan were grounded several days last week pending a maintenance check after fire broke out on an Iwo Jima-bound Globemaster June 12. Pentagon sources said it apparently was a temporary measure restricted to the 374th Troop Carrier Wing. Only the Japan-based C-124s were grounded.

New Rato (rocket assisted takeoff) unit, Aerojet-General Corp.'s 14AS-1000 G-1, has been approved by Civil Aeronautics Administration as a standby power source for commercial aircraft. Rocket produces 1,000 lb. thrust for 14 sec.

Harry K. Coffey, Portland, Ore., president of National Aeronautic Assn. and one of the founders of the Civil Air Patrol, has received the Exceptional Civilian Service Award for his service to CAP from January 1942 to May 1952. He received the highest award made to civilians from Assistant Secretary of the Air Force H. Lee White in a Pentagon ceremony.

Fairchild Engine & Airplane Corp.'s Stratos Division at Bay Shore, N. Y., has received new orders for aircraft accessories totaling more than $11.5 million to go with military planes.

Production record is claimed by North American Aviation in T-28A output, pushing the Air Force trainers off assembly lines at the Downey, Calif., plant on or ahead of schedule for 31 consecutive months.

CERTIFICATION has been granted by Civil Aeronautics Administration to the first commercial Lockheed Super Constellation powered by Wright Turbo Compound engines. Here is a Turbo Compound-powered Super Connie, bearing KLM Royal Dutch Airlines' markings, is seen prior to delivery to the carrier June 15. Next in line for deliveries are Air France and Eastern Air Lines. The new version of the Super Connie earned its CAA certificate following a 48-day test period, which was less than the earlier Super Constellation model required for its approval by CAA.

AF Air Training Command will celebrate its 10th anniversary July 7 at 43 bases.

Strategic Air Command bombers will "attack" U. S. and Canada next month in a joint test of North America's air defense systems.

National Labor Relations Board has issued a complaint against Boeing Airplane Co., charging the firm failed to bargain in good faith with the Seattle Professional Engineering Employes' Assn. in negotiations for an 8.7% wage increase. NLRB also accuses Boeing of violating the Taft-Hartley Act by firing an engineering employe for his activities in a manpower conference.

Financial

Ryan Aeronautical Co., San Diego, reports a net profit of $792,833 for the first half of fiscal 1953, more than double the $347,675 net for the first six months of last year. Sales for the period ending Apr. 30 were $21,530,821, compared with $13,747,077 for the first half of fiscal 1952.

Solar Aircraft Co., San Diego, made record net income of $2,809,407 and sales totaling $69,401,195 during the fiscal year ending Apr. 30, compared with a net of $1,440,022 and $52,231,172 in sales for the previous year.

Temco Aircraft Corp., Dallas, has declared a regular quarterly dividend of 10 cents and an extra of 5 cents per share of common stock.

International

Nine persons were killed and eight injured last week when a Linea Aerea de Costa Rica, S. A. (Lacsa) twin-engine transport crashed in the San Ramon Mountains north of San Jose.

Swedish Stal Dovern 2 nine-stage axial-flow turbojet of approximately 5,700 lb. thrust will be exhibited at the 20th International Air Show, Paris, June 26-July 5.

Nationalist Chinese Air Force on Formosa has taken delivery of its first U.S.-built jet fighters, an undisclosed number of Republic F-84 Thunderjets.

Prototype Gloster Javelin, twin-jet delta-wing fighter, crashed during a test flight June 11 near Bristol, England, killing pilot Peter Lawrence.

Comet 3s will be flying the new German Lufthansa's overseas routes by 1960, forecasts Werner Kreipe, director of the Aviation Division, West German Transport Ministry.

Production Gannet, anti-submarine aircraft, has completed its first test flight and has been delivered to the British Ministry of Supply, Fairey Aviation Co., Ltd., announces.

U. S. Mutual Security Agency has approved a $3.7-million loan to Italy's Fiat Corp. to finance import of American equipment to produce jet engine spares.

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ANGLgears are described fully in the I.A.S. Aeronautical Engineering Catalog. We suggest you refer to this publication for complete data.

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The Aviation Week

June 22, 1953

Headline News

AF Loses Ground on Cutbacks..... 12
F-84F Spares to Be Built in Europe.... 14
Plane Slashes 15
Kaiser Calls 'Foul'; Quiz Deepens..... 15
AF Tries 'Weapons System' Plan..... 16
New Jet Pact..... 16
Comet Crash Report Draws Fire..... 17
RCAF Shows Off Its First Comet..... 18
Italy's Fiat to Make 50 F-86Ds..... 21
Temco Turboprop Trainer..... 22
Miss Cochran Holds Most Jet Records.. 26
Australian Jets Hit Production Snags... 26

•

Aeronautical Engineering

Rockets Put New Life in Autogyro.... 28

•

Production

Many Plastics Go in Convair 340..... 41
Parts Production Streamlined..... 50

•

Equipment

Fram Hits Pay Dirt in Engine Oil..... 74

•

Aviation Safety

Propwash Caused Bonanza Crash..... 65

•

Air Transport

BOAC Seeks Successor to Comet 3.... 91
EAL-Colonial Merger..... 94
Convair Says It Likes Turboprops..... 94
CAB Names Sawyer Executive Director 95

•

Departments

News Digest 7
Washington Roundup 9
Who's Where 11
Industry Observer 11
Thrust & Drag..... 36
Letters 39, 106
What's New 44
Production Briefing 62
Off the Line 80
New Aviation Products..... 84
Also on the Market..... 86
CAB Orders 96
Shortlines 97
Cockpit Viewpoint 104
Aviation Calendar 104

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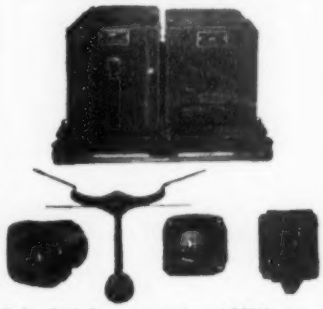

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Washington Roundup

USAF: $6.5-Billion Cut?

Air Force has an uphill fight against an even bigger cut than the $5 billion already recommended by the Administration. The latter slash would reduce USAF's fiscal 1954 budget from $16 billion in the Truman budget to $11 billion.

Even if Congress should restore the $5 billion, unlikely in view of Russia's apparent intent to call off the cold war for the time being, it is no guarantee the Air Force will get the money. Congress can't force the Administration to spend or obligate. In fiscal 1950, for example, former President Truman and former Defense Secretary Louis Johnson withheld from USAF $800 million that was voted by Congress.

Now there is the prospect the Administration may hold USAF's budget at substantially below $11 billion. Defense Secretary Charles Wilson thinks, "on cold calculation," that the budget contains $1 to $1.5 billion "too much" for aircraft procurement, and has told senators so. He wants Congress to appropriate the full $11 billion, however, to allow "turnabout time" to permit changes "by evolution instead of revolution."

He explained: "This is a little change for the aircraft industry. They have sort of gotten used to having a lot of business on the books. You know the president of an aircraft company likes to make a report to stockholders saying he has three years' business on the books."

An additional $1.5-billion reduction would leave USAF only $2 billion new money for contract letting for aircraft and related procurement in the coming year, compared with the $12 billion available this year. Truman budget recommended $6.6 billion, and the Administration budget $3.5 billion.

From his own viewpoint, Wilson suggested that in asking for "too much" USAF money "maybe we did make the right decision because we are having enough trouble to explain to people the $5-billion cut. If it were $6.5 billion, we would be in more trouble, I suppose."

No Louis Johnson

Defense Secretary Wilson is noticeably irritated over being compared to former economy-minded Secretary Louis Johnson, who cut back the 70-group USAF program and held the military budget to $13 billion a few years ago.

Stating that he was in emphatic disagreement with those actions at the time, Wilson exclaimed at one Senate session: "My middle name is not Johnson." He saw eye-to-eye, he said, with former USAF Secretary Stuart Symington who, according to Senate testimony, resigned in protest over the Johnson air cuts. Throwing cold water on talk of his leaving, Wilson added that he probably wouldn't have resigned under similar circumstances: "I might have made another try to sell my program. I always have liked to make a sale when I was right."

Slash in Tactical Wings?

There may be a fight in the plan to make tactical air bear the brunt in the cutback in the USAF program from 143 to 120 wings. Of the 23-wing reduction, USAF's Chief of Staff Gen. Hoyt Vandenberg testified that 15 would be in tactical wings, five in strategic air, and three in airlift wings. But Undersecretary Roger Kyes later reported that no firm decision as to how the 120 wings would be sliced had been made. Army is expected to oppose a heavy reduction in tactical air.

Vandenberg Defender

Sen. Lister Hill, who has sponsored General Vandenberg's side in the Vandenberg-Wilson controversy, was somewhat startled at Wilson's taking him to task for "marking down" the USAF chief.

Wilson observed: "I think it is a shame to put General Vandenberg into a controversy like this. I have known him a long time. I have been deer hunting with him and I have known him socially as well as in a business way. I think we expect too much of some of our military people. We expect them to be planners and business people and organizers and great leaders. The country owes a lot to General Vandenberg. He is an air enthusiast that proved to the country that we needed a big Air Force.

"He is a great salesman and he made the sale. From his point of view he did his duty. The fact that the Air Force did not make good after he got the money from Congress, he will not take much responsibility for. He is sincere. He did a great thing for the country and we ought not mark the general down."

ODM: Here to Stay

After several months of upheaval and uncertainty, Office of Defense Mobilization is rapidly organizing to handle defense planning and industrial mobilization. Congress has given implied approval to the President's plan, which makes the agency permanent, abolishes National Security Resources Board and the Munitions Board and transfers their functions to ODM—simply by not vetoing it within 60 days.

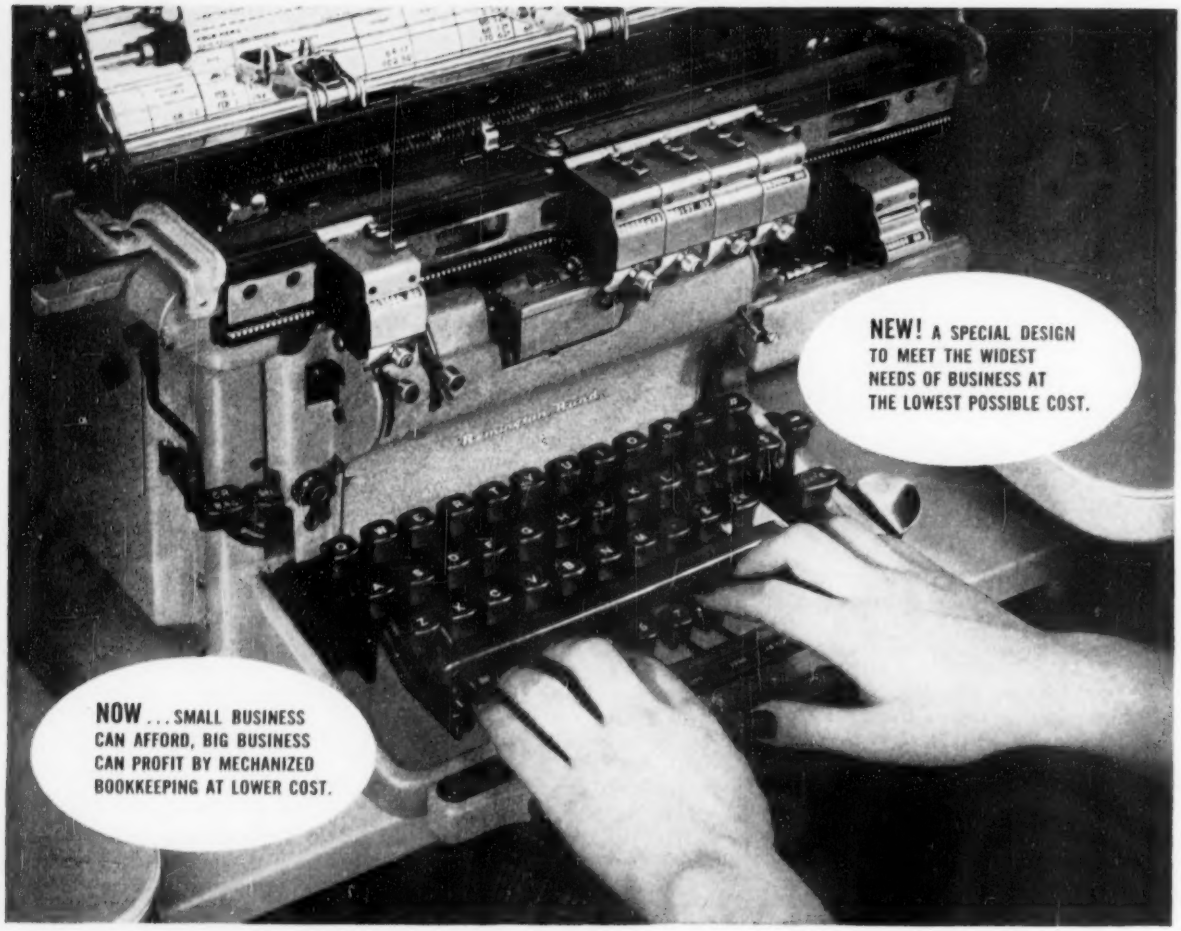
Director Arthur Flemming's aim in ODM administration will be to build up a large reservoir of executives with industry and government experience. Six assistant directors—for production and requirements, materials, non-military defense, financial policy, economic stabilization, manpower—will be drawn from various fields to serve brief periods, probably a year. Under each assistant director will be a government career official to provide continuity.

Air Subsidy Separation

No opposition has developed to the President's plan directing separation of mail pay from subsidy and requiring that subsidy be paid airlines by Civil Aeronautics Board instead of Post Office—and none is likely.

Sen. John Kennedy and members who have supported his approach to the issue do not feel the plan goes far enough, but that it is all right as far as it goes and there is no point opposing it. They object that it doesn't remove the 1938 Civil Aeronautics Act's requirement that airlines be paid on a basis of "need." Kennedy will continue to push for legislation setting a "cost" instead of a "need" standard for mail pay, and has the President's support. However, the plan, by accomplishing half the objective, has taken wind out of the drive for legislation.

—Katherine Johnson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WHO'S WHERE

In the Front Office

Air Marshal W. A. Curtis, who retired recently as RCAF chief of air staff, is new board vice chairman of A. V. Roe Canada, Ltd., Toronto.

Rear Adm. R. A. J. English (USN Ret.) has been elected vice president-engineering and production of American Pipe & Steel Corp., Alhambra, Calif. **L. E. Howard, Jr.,** secretary and treasurer, and **Carl B. Dahlberg,** vice president-sales, have been named to the board.

J. J. Arostegui and **Max H. Crawford** have been elected treasurer and secretary, respectively, of Lockheed Aircraft Service-International, New York and LAS, Burbank.

Changes

Joseph A. Cannon has been appointed chief of flight test for Bell Aircraft Corp., Buffalo, N. Y., succeeding **Jean L. (Skip) Ziegler,** killed when the X-2 rocket plane exploded May 12 (AVIATION WEEK May 18, p. 9).

Joseph R. Horton has been named director of maintenance and engineering for Braniff International Airways. **G. D. Smith** has been promoted to maintenance and engineering director of Braniff's Twin Cities overhaul base.

George Gasper is new chief of design operations and **James R. Lengen** has been appointed acting supervisor of design liaison group, Chance Vought Aircraft Div. of United Aircraft Corp. at Dallas.

William M. Ehart has been appointed National Airlines public relations director.

Finn J. Larsen has been named research director of Minneapolis-Honeywell Regulator Co., Minneapolis, succeeding **Waldo Kliever,** who resigned.

Thomas A. Daly has been promoted to manager of technical operations of the Aviation Gas Turbine Div. Westinghouse Electric Corp., Philadelphia. Other changes: **Joseph F. Chalupa,** manufacturing manager South Philadelphia plant; **Hewett R. Arnold,** assistant manager-technical operations; **James W. Fatkin,** assistant to the division manager, and **Vincent J. Gordon, Jr.,** assistant manager-production.

Richard M. Faulconer has been appointed group engineer-salvage and liaison of Engineering and Research Corp., Riverdale, Md. **Jerry Silberstein** is new project engineer for flight simulator production.

Michael J. DiToro has joined Fairchild Engine & Airplane Corp. to head electronic development in the engineering department of the Guided Missiles Div., Wyandanch, N. Y. **Siegfried Langner** is new factory manager of Stratos Div., Bay Shore, N. Y.

Honors & Elections

Alexander Petrides, supervisor of engineering services at Kaman Aircraft, Windsor Locks, Conn., is new vice chairman of the Eastern Div., National Aircraft Standards Committee.

INDUSTRY OBSERVER

► Some Douglas sources say the next Douglas airliner will be turboprop, not turbojet, as indicated in earlier planning with Pratt & Whitney J57 engines in the proposed DC-8 design. Very substantial difference in cost is cited. There is talk the bill for the DC-8 development may be underwritten by the military services.

► **Convair's new delta-wing F-102 interceptor has a good approach to the canopy-release problem for emergency escape, USAF safety analysts believe release is spring-loaded and designed so the canopy will be forced up at the front by the airstream until it makes a 90-deg. angle with top of the fuselage.**

► Allison Division, General Motors Corp., is getting a running start as a missile jet powerplant maker. Every turbojet-powered missile fired in this country up to the end of May was powered with an Allison engine, mostly the J33.

► **Lockheed, working under a tight schedule to turn out its prototype lightweight F-104, is doing much of the work it ordinarily would farm out to subcontractors. West Coast sources say speed of the F-104 will be considerably less than the 1,500 mph. reported recently by the Los Angeles Examiner. The newspaper said the airplane had a 28-ft. wingspan, paper-thin swept wings and negative dihedral. Other sources, however, expect Lockheed to keep its thin straightwing design philosophy.**

► Canadian Air Force officials are studying a recent spin accident of an RCAF F-86E Sabre. Pilot bailed out of fighter after he was unable to recover from the spin which started at high altitude. Spin is believed to have resulted when one leading-edge slat became stuck in extended position, making the airplane aerodynamically assymetrical and uncontrollable.

► **Rolls-Royce reports substantial reductions of jet engine noise in the low-frequency range have been accomplished by installation of "teeth" placed around the rim of the tailpipe in engine tests. The teeth are simple metal extensions parallel to the jet stream and help to dissipate the low-frequency noise at negligible cost in engine performance. However, some increase in high-frequency noise level is reported.**

► Allison deliveries of J35 engines will be reduced almost to half of the present rate with the phaseout this summer of the Republic F-84G Thunderjet straightwing fighter. Plane will be succeeded by the F-84F sweptwing fighter, powered by the Curtiss-Wright Sapphire J65.

► **Preliminary results of United Air Lines airborne radar flight tests appear to confirm the experts' predictions that the new (5.7-mc) wavelength is superior to X-band radar for spotting and mapping storms (Aviation Week Mar. 9, p. 40). UAL began its tests earlier this month using an experimental radar built by RCA and installed in a DC-3.**

► A Grumman guided missile powered with an integral ramjet is undergoing simulated flight testing in Marquardt Aircraft Co.'s California jet lab. Use of blowdown air enables engineers to simulate actual flight conditions for test without loss of the missile.

► **Douglas El Segundo plant expects to move its F4D Navy interceptor production to the company's new plant at Torrance, Calif.**

► Curtiss-Wright says aggregate time on Wright Cyclone 18s (R3350s), now totals 24 million flight hours, of which 10 million are commercial time. The 10 million commercial hours, translated into airplane miles, figure out to more than 700 million miles, or the equivalent of 28,000 round-the-world flights at the Equator.

► **The Douglas DC-8 mockup at Santa Monica is veiled behind a green canvas curtain from ceiling to floor, guarded by plant police.**

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USAF Loses Ground in Cutback Fight

- **Vandenburg waters down request for full budget.**
- **President backs Wilson's economy program.**

By Katherine Johnsen

Air Force's fight against Defense Secretary Charles Wilson's $5-billion slash in USAF fiscal 1954 appropriations has fizzled to a $1.4-billion controversy—and the outlook for restoring even that much of the cut by Congress is not bright.

The budget proposal, submitted by request to Senate Appropriations Committee by USAF Chief of Staff Gen. Hoyt Vandenberg, calls for $13.12 billion. This is an increase of only $1.44 billion in the $11.7-billion Wilson budget and falls $3.66 billion short of the $16.8-billion Truman budget. The Vandenberg request includes $353 million additional for 447 airlift and support planes.

Vandenberg told senators during the course of his testimony a few weeks back that because of the lapse of time, personnel limitations and other administrative restrictions of the Wilson regime, USAF would not be able to use effectively the full $5-billion Wilson cut if it were restored. He said at that time he would recommend restoration of "something less than $5 billion." And senators were surprised last week when he recommended only $1.4 billion be restored.

▶ **Vandenberg Explains**—Some of the reasons the new USAF budget falls so far short of the estimate made in January in the Truman budget, as explained by Vandenberg:

- **It defers $655 million** in financing of aircraft and other procurement because of reduced re-order time on the books.
- **It defers procurement** of B-47s in the amount of $400 million.
- **It eliminates procurement** of combat planes for a small reserve in the amount of $233 million.
- **It involves cancelation** of planned trainer aircraft procurement in the amount of $250 million.
- **It reduces operational funds** by $558 million because of the stretchout.

▶ **The Programs**—As far as air power in being goes, this is the picture:

- **The Truman budget** contemplated 133 wings by mid-1954, 137 wings by mid-1955 and 143 wings by mid-1956.
- **The Vandenberg proposal** looks to 120 wings by mid-1954, 135 wings by mid-1955, 141 wings by mid-1956 and 143 wings by mid-1957—if supported by adequate appropriations after fiscal 1954.
- **Under the Wilson program,** USAF would reach 110 to 114 wings by mid-1954, achieve 120 wings by mid-1955, stay at this strength to mid-1956.

Proposed Air Force Budgets

(Figures in millions of dollars)

	Truman Budget	Wilson Budget	Now Recommended by Vandenberg	Difference Between Wilson and Vandenberg Recommendations
Aircraft and related procurement	$6,664	$3,495	$3,848	$353
Major procurement other than aircraft	900	625	675	50
Base construction	700	400	660	260
Maintenance and operation	4,235	3,200	3,800	600
Military personnel	3,560	3,300	3,472	172
Research and development	537	475	475	----
Reserve personnel	23	14.9	14.9	----
Air National Guard	128	147.1	147.1	----
Contingencies	31	31	31	----
Total	$16,778	$11,688	$13,123	$1,435

▶ **Urgency Gone**—Russian peace moves, sapping urgency out of defense mobilization, and the Republican determination to accomplish a balanced budget and tax reductions before the November 1954 elections stacked the odds at the outset heavily against Air Force in its fight on the $5-billion Wilson slash.

But there have been these developments stacking the odds even heavier against USAF:

- The President is affirmatively supporting the Wilson program—although he has not yet specifically endorsed the $5-billion slash. In a public speech, the President "personally" guaranteed:

"It promises more efficient military production. It realistically assesses our long-term economic capacity. It demands the elimination of luxury, waste and duplication in all military activity. And it allocates funds as justly and wisely as possible among the three armed services."

This puts pro-USAF congressmen in the position of advocating that taxpayers pour more money into the Air Force buildup than the U. S.' top military expert—Eisenhower—considers necessary.

- Vandenberg's watered-down request for $1.4 billion and his emphasis on operational, personnel and construction money has taken drama and political appeal out of the USAF case. Committees of the last Democratic Congress repeatedly blasted the Air Force for waste and extravagance in its utilization of personnel and construction projects.

Also, Wilson's removal of a firm ceiling on USAF spending which might slow plane deliveries, his emphasis on "security first and economy second," and his assurance that the Administration isn't committed against a 143-wing USAF but simply wants to look it over, have taken the edge off the Air Force fight in Congress.

▶ **Rush Action**—House Appropriations Committee is rushing to complete action on the defense appropriation bill by June 26, or June 29 at latest. In this first test, some observers believe, USAF will be lucky if the $11.6-billion Wilson budget isn't reduced still further.

Budget-cutter Rep. John Taber, chairman of the committee, has stacked the nine-member subcommittee which will work out the defense bill heavily on the side of economy. The subcommittee includes six Republicans and only three Democrats. Rep. George Mahon, top Democrat on the subcommittee, who sharply challenged the $5-billion USAF cut when it was announced early in May, will not put up a strong fight for more USAF money.

His outlook: Even if Congress appropriates more money, the Administration won't spend it, so the question is mainly whether members should make

a record on the issue with speeches and recorded votes.

"I don't feel I want to stake my reputation on something that isn't practical," he commented.

▶**Other Reaction**—There were these other developments:

• **House Majority Whip,** Rep. Leslie Arends, sarcastically blasted the Air Force in a major floor speech:

"Just as the birds, the bees and the flowers emerge each spring from their winter's sleep, in Washington the Air Force budget also bursts forth each spring, in full flower.

"It is perennial, rooted in more than military reality. It is also rooted in politics, in emotionalism, in service rivalry, and in the evangelism of the Air Force cult which says annually that any independent analysis of the Air Force budget will voodoo the nation.

"This Air Force drive for a larger budget is an annual event. It used to be accomplished by air shows, remarkable highspeed or long-distance flights and suddenly discovered enemy threats to our nation. It offers excitement and controversy. It annually reminds us what would happen to our nation if we should ever lose civilian control over our armed forces."

• **Wilson,** in a written reply to 32 questions put by Sen. Margaret Chase Smith, strongly defended Navy's carrier aviation and Army's development of an atomic cannon against any implication they are more expensive and less efficient substitutes for land-based air power.

"An atomic cannon," Wilson observed, "is obviously not as mobile as a jet fighter bomber in the air, but it is much more mobile than the jet fighter-bomber if weather or other conditions prevent the bomber from flying or participating in the action. It is expected that the atomic cannon will be able to move along with the ground forces to which it will be normally attached, which is a great advantage, just as in the case with ordinary heavy artillery."

Carrier aviation is not expected to be a "substitute" for strategic air power, he declared, but "will be able to assist the Air Force and supplement its activities in discharging its primary responsibility for strategic air power."

▶**Firepower**—Arends touched on the question of possible reduction in "numbers" of planes in view of radically increased atomic punching power. Vandenberg declines to concede that any reduction in numbers is warranted because of developments in atomic firepower, arguing that the same plane "formation" would be required to accomplish a mission.

Suggesting that "we are in the era of the 'battleship general' in the Air Force," Arends reported that one bomb now has the explosive power equivalent to a mass bombing attack with full bombload of 12,500 B-17 bombers in World War II. One fighter plane today, he said, now has the destructive power of at least 5,000 World War II heavy bombers.

▶**Smith Questions**—These were among the questions asked by Sen. Smith and answered by Wilson:

• How has the nature of the Communist threat changed so that we need only 120 instead of 143 wings, and yet we still need the same number of Army divisions and Navy combat ships as contemplated by the Joint Chiefs of Staff in 1951?

"I would like to emphasize that the reference to the Air Force aircraft which is assigned to wings focuses attention on a segment of our air power, leaves out the 60% of the Air Force aircraft which are not assigned to wings, without which the aircraft assigned to wings would have little value, and does not deal with the 9,941 airplanes which will be kept in operation by the Navy and the Marines and which, of course, must be considered in estimating our overall air power.

"If the Navy and Marine planned air strength is grouped into wings on the same basis as the Air Force aircraft are grouped into wings, the total defense program of President Eisenhower calls for the establishment of 176 wings by July 1, 1956. Using the same comprehensive calculation. . . . We now have 152 wings on hand and available for national security purposes, and, in addition, 60% of all Air Force aircraft, and 6,484, planes in the Navy and the Marines which are not assignable to wings. . . ."

• Hasn't the main deterrent to aggression been our long-range Air Force, with its atomic capability?

The deterrent is much broader. I think there is a deep realization in Mossow that any major aggression against the free world will start a conflict in which all the forces of the free world will be marshalled to crush such aggression, and that the forces of the free world include not merely our long-range bombers. . . ."

• The Pentagon has announced that the new Joint Chiefs of Staff will restudy the whole strategic situation next fall. Wouldn't it make more sense to give the JCS time to review our present strategy before making arbitrary cuts in the budget?

". . . In the meantime, we believe that we have planned a sound defense and security program."

• How much will the government lose by canceling Air Force contracts?

"Any cancelation which will be made with respect to aircraft will be on the basis that such aircraft are not deemed essential to the national

JAPS TEST HOME-MADE LIGHTPLANE

Successful flight tests have been made with this little two-place craft designed by aeronautical engineering students of Nihon University and built in a Yokohama furniture factory. Powered by a 65-hp. Continental engine donated by Pan American World Airways' Far East regional director, Dallas B. Sherman, the craft has top speed of approximately 110 mph. Designated the N-52, it has wings and ailerons of plywood construction, fabric covered. The fuselage and tail surfaces are of welded steel tubing, also fabric covered. Plans are to have the plane licensed for student instruction.

security or because of changes in requirements."

• Have some people in the Defense Department been trying to force the Air Force to reduce its strategic air power?

"No, although there may be differing opinions among military men, including officers in the Air Force itself, especially as to all of the methods by which strategic air power may be exerted. This is one of the very important subjects in respect of which I expect the careful study and advice of the new JCS.

"In that connection, I expect the new JCS will consider the bomb-carrying capacities and the ranges of all types of aircraft, and also all other methods of bringing destruction to industrial and behind-the-line support of any enemy."

• Is the Nike missile going to do away with the need for the Air Defense Command?

"No one has ever suggested that the Nike would do away with the Air Defense Command. It is a new weapon which should contribute importantly to the defense of the U. S."

• Who decided to start on the second and third "super carriers"? Did the JCS approve these two carriers?

" 'Super carrier' is not, in the opinion of the Navy, the proper designation for the new modern aircraft carriers. . . . I am informed that it is not the practice of the JCS to specifically approve or disapprove any particular items such as a type of tank, ship, or aircraft. The formulation and content of shipbuilding programs for the orderly replacement and modernization of ships are recommended to the Secretary of Defense by the Navy Department. . . ."

India Buys French Jets

(McGraw-Hill World News)

Bombay—The Indian Air Force has negotiated for three squadrons of French Dassault Ouragan single-seat jet fighters powered by Hispano-built Rolls-Royce Nenes. Industry observers say that Britain's "take it or leave it" attitude concerning delivery dates of new equipment and failure to supply jet engines for the IAF's de Havilland Vampires is behind the decision to buy French.

F-84F Spare Parts To Be Built in Europe

Spare parts for Republic F-84F jet fighters of the North Atlantic Treaty Organization air force soon will be built in Europe. USAFE has signed a two-year, $50-million contract with Republic Aviation International of Lugano, Switzerland, to be paid for out of Mutual Defense Assistance Pact funds.

European subcontractors will be given contracts to build the parts in order to shorten present U.S. supply lines and to aid continental firms by adding American dollars to their treasuries.

Republic International will supervise production, provide special tooling where needed, lend technical assistance, pass along American production know-how and maintain its own inspection system.

NATO member nations thus will become self sufficient in supporting the F-84Fs with which they are being equipped. The contract was signed at Wiesbaden, Germany, June 10 by Mundy I. Peale, Republic president and general manager, who is a representative of the International Division and Maj. Robert C. Borman of USAFE's Procurement and Production Division.

As European subcontractors swing into production, the American spare parts delivery will be phased out entirely.

PIASECKI WORK HORSE FOR ARMY

First view of a Piasecki H-21C Work Horse slated for the U. S. Army shows the big copter hovering at Philadelphia International Airport, Pa. Capable of carrying 20 soldiers or two tons of cargo, the H-21C is the most powerful of the Work Horse series. It is fitted with a 1,425-hp. Wright Cyclone. The Air Force H-21A has a 1,150-hp. Wright engine. The H-21s are largest production copters in the world.

C-54 Recall

- **AF calls back 37 cargo transports from airlines.**
- **C-46s may come next; threat to nonskeds seen.**

Air Force recall of 37 C-54 transports, coupled with the possibility 90 C-46s leased to domestic airlines also would be called back to military service, last week posed a major threat to many airline operators, with some nonskeds facing equipment bankruptcy.

The USAF move came, observers believe, as a preface to curtailment of the entire Air Force cargo transport program, including the Chase C-123 assault transport, as USAF began to size up the current budget handwriting on the wall.

▶ **Gradual Recall**—Each of the airlines involved in the major recall have been notified when delivery of their C-54s to Air Force is due. Pentagon officials said, however, that the return to Air Force fold would be made at a gradual rate.

Leased aircraft come under an Air Force recapture clause agreement which entitles USAF to call back its planes on 48 hours notice. C-54s and C-46s were first leased shortly after World War II as a reserve potential for USAF and a fleet bolsterer for airlines.

Twenty of the C-54s to be recalled are operating on the Pacific airlift. Overseas National Airways, Inc., uses its four leased C-54s exclusively on the Pacific lift. Since the four C-54s comprise its entire fleet, ONA stands to be wiped out equipment-wise.

▶ **Hope for Re-Lease**—A spokesman for one airline said, however, that there is still considerable hope that all of the planes will not be recalled and if they are some will be re-leased. He found some hope in Gen. Hoyt Vandenberg's recent testimony before Senate Appropriations Subcommittee that the Air Force contract lift might continue at one-fifth of "what it used to be."

An Independent Military Air Transport Assn. spokesman said Air Force now plans to have individual conferences with the carrier operators of C-54s. He said "general belief is that commercial operators can serve Air Force under contract at one-half to two-thirds the cost to Air Force to run them."

Spokesman for Pan American, which operates 16 Air Force C-54s, said the company planned to hold another meeting with USAF officials last Friday night out of which might come some further information on Air Force plans.

▶ **Airlines Hit**—Airlines and individuals

affected by the recall and the number of aircraft to be returned:

Pan American World Airways, 16; Trans World Airlines, 2; Northwest Airlines, 5; Great Lakes Airlines, 1; Viking, 1; Seaboard & Western Airlines, 1; Transocean Airlines, 1; Flying Tigers, 2; George Enloe, Burbank, Calif., 2; Frances Christmas, Anchorage, Alaska, 2; George Tompkins, Overseas National Airways, Inc., San Francisco, Calif., 4.

▶ **C-46 Recall**—Air Force is working out recall plans for its 90 leased C-46s. It appears likely C-46s will begin rolling back to Air Force by the end of 1954. Airlines leasing C-46s:

Aerovias Sud America, 1; Air Transport Associates, Inc., 4; Alaska Airlines, Inc., 3; Allegheny Airlines, 1; American Air Transport, Inc., 1; Argonaut Airways Corp., 1; American Air Export & Import, 4; Aviation Corp. of Seattle, Inc., 2; Associated Air Transport, 1; Capital Airways, Inc., 1; Caribbean American Lines, 1; Continental Charters, Inc., 3; Connors Airlines, 2; Consolidated Airlines, 1; Coastal Cargo Co., 2; Economy Airways, Inc., 1; Flying Tiger Lines, 6; Meteor Air Transport, Inc., 2; Miami Air Line, Inc., 2; National Airlines, Inc., 2; North American Food Carriers, 1; Resort Airlines, Inc., 9; Riddle Aviation Co., 4; Slick Airways, 16; Southern Air Transport, 3; S.S.W., Inc., 1; Trans-Caribbean Airways, 2; Transocean Air Lines, 4; United States Airlines, 6; World Airways, Inc., 2; Lake Central Airlines, Inc., 1.

Some observers were quick to point out that the Air Force, with a simple directive recalling the C-46s, would do more to restrict nonsked flight frequency than Civil Aeronautics Board had been able to with enforcement proceedings.

Air Guard Expands

Air National Guard is expanding its 84-squadron strength by 168 additional tactical and technical squadrons. Organization of the new squadrons, two for each of the present units, is to be completed by the end of fiscal 1956.

First of the new units, the 8199th Replacement Training Squadron, will be located at Hickam Air Force Base, Honolulu, home of ANG's 199th Fighter Squadron.

Replacement units will be made up of combat crew and maintenance personnel. They will use the parent squadron's training sites, equipment and aircraft. Maj. Gen. Earl T. Ricks is acting chief of the National Guard Bureau, parent organization for the ANG.

Plane Slashes

- **Defense discloses three contract cancelations.**
- **Temco says F3H cut hits combat aircraft.**

Temco Aircraft Corp. president Robert McCulloch last week followed up a telegram to Defense Secretary Wilson with a personal visit to Washington asking top-level clarification on the order he had received terminating Temco's second-source Navy contract to build the McDonnell F3H Demon jet carrier fighter.

The Temco cancellation was one of three disclosed by the Defense Department. Also canceled:

• **North American XA2J** twin-turboprop carrier-based bomber.

• **Beech Aircraft T-36** twin-engine trainer, also canceled at second-source producer Canadair, Ltd., Montreal.

▶ **Seek Subcontracts**—At Dallas, in announcing the cancelation of the McDonnell carrier plane at Temco, McCulloch said he and other company officials were going to St. Louis to discuss with James McDonnell, president of McDonnell Aircraft Corp., the possibility of Temco providing subcontract support for the McDonnell F3H program.

Meanwhile, Defense Department officials disclosed that despite Defense Secretary Charles Wilson's announced policy of terminating second-source producer contracts, there were four second-source contracts still being continued:

• **General Motors** contract to produce the Republic F-84F jet fighter, supplementary to Republic Aviation's production.

• **Canadair, Ltd.** contract to produce the Beech T-34 Mentor single-engine trainer, supplementing Beech production.

• **Douglas-Tulsa and Lockheed-Marietta** contracts to produce the Boeing B-47, supplementing Boeing-Wichita production.

• **Kaiser-Frazer Corp.** contract to produce the Fairchild C-119 Packet, supplementing Fairchild production.

McCulloch said notice of termination on the F3H from Navy Bureau of Aeronautics gave no reason for the termination.

▶ **Wilson Contradiction**—McCulloch said the cancellation appeared in direct contradiction to the policy stated by Secretary Wilson at a luncheon conference with members of the Aircraft Industries Assn. June 2—that no cancelation of combat-type aircraft would be involved but there would be some reduction in non-combat types.

Reiterating a position he took recently in a exclusive AVIATION WEEK interview (June 1, p. 15), McCulloch said he could not accept the reasoning that increased cost would result due to Temco being a second source. He cited his company's record of producing aircraft and assemblies at "half the average industry cost" and pointed out that Temco's F3H program is well ahead of schedule.

"The only reason which would warrant this action in our opinion," McCulloch said, "would be a marked reduction in the quantity of aircraft required or in funds available for their procurement."

▶ **Additional Cancelations**—Unofficially, some Navy sources indicated that the North American turboprop cancelation was due to difficulties with the powerplant, the Allison T40, which has slowed testing on the airplane. Two of the airplanes have been completed. It is understood the airframes will be mothballed by the Navy and held pending further developments in the turboprop powerplant field. It is possible Navy may seek to reinstate the airplane if powerplant difficulties are overcome.

At Wichita, president Olive Ann Beech confirmed the T-36 cancelation, but said her company would complete prototype units now being built. She said Beech would concentrate on other military production contracts and on commercial orders. Other Beech contracts include:

• Overhaul and modification of USAF C-45G and Navy SNB Twin-Beech model 18 trainer-transports.

• Production of USAF L-23A Twin-Bonanza in quantity for the Army Field Forces.

• Production of the USAF T-34A single-engine trainer for the USAF and the Chilean air force.

• Production of complete wing assemblies for the Lockheed T-33 jet trainer and F-94C jet interceptor.

Kaiser Calls 'Foul' As K-F Quiz Deepens

Kaiser-Frazer's C-119 production problems moved last week from a Senate hearing room to the Department of Justice and to Willow Run, Mich.

Sen. Styles Bridges, Chairman of the Senate Armed Services Subcommittee which has been investigating the Kaiser-Frazer Air Force contract, sent a transcript of testimony taken during the recent investigation to the Justice Department to determine if fraud might be involved in the case.

Henry Kaiser, chairman, and his son, Edgar F. Kaiser, president, of Kaiser-Frazer, rushed to Washington as the case boiled, demanded to be heard "right away." The elder Kaiser claimed

that his side had not yet been heard. "If the Air Force isn't going to tell our story," he said, "then we'll have to tell it ourself."

▶**C-123 Next**—Meanwhile, the Senate subcommittee was hurrying to complete its interim report of the hearing before going into an investigation of K-F's Air Force contract to build the Chase C-123 assault transport.

Reliable sources reported the committee would ask the Air Force to dismiss one, perhaps two, of the officers involved in the K-F contract deal.

▶**Study Termination**—In a meeting with Air Force Secretary Harold Talbott, Senator Bridges is reported to have made it quite clear his committee intends to press for immediate action on K-F's future in aircraft production.

Talbott told Bridges he had instructed Air Force to send a team to Willow Run to study the cost of terminating the remainder of K-F's C-119 contract. Bridges' committee is making a similar study itself. Should USAF determine it would be cheaper to let the K-F contract run its course now, Bridges will call on Air Force auditors to testify to that publicly.

Armed with the two studies in addition to the committee's interim report of the hearing, Bridges' committee will go ahead with a probe of the C-123 contract K-F expects to start after phasing out its C-119 contract.

▶**O'Konski Attack**—As brought out in the Senate hearing (AVIATION WEEK June 15, p. 15), K-F is now producing the C-119 Flying Boxcar at five times the cost of C-119 production at Fairchild Airplane & Engine Corp. (developer of the cargo transport) at Hagerstown, Md. The hearing also brought to light attempts of Kaiser-Frazer to charge off automotive costs to its Air Force production contract.

Rep. Alvin E. O'Konski, who called for cutting off K-F's C-119 contract when the issue came up in May 1952, bitterly attacked K-F again last week in a House speech. He asked Air Force to "award the balance of the C-119 contract to Fairchild." This, he said, "would result in a clear savings to the American taxpayer of at least $25 million."

▶**Duty to People**—"Why," he asked, "cannot the Air Force see what everybody else has found out—that the only way to do business successfully with the Kaisers is not to do business with them at all."

"King Henry stands exposed in all his tarnished glory," said O'Konski. "We have a duty to the American people to see that he is deposed regardless of what special interests may be working for him."

Senator Bridges has indicated that the C-119 probe is completed.

AF Tries 'Weapons System' Plan

Convair XB-58 project seen as test of plan giving airframe makers responsibility for buying equipment.

By Philip Klass

A new Air Force procurement policy of industry-wide significance is getting its first trial in Consolidated Vultee Aircraft Corp.'s supersonic bomber program, A. C. Esenwein, Ft. Worth Division manager reports. The plane presumably is the XB-58.

The new "weapons system management" plan gives Convair almost complete responsibility for selecting and buying the multitude of equipment (bombing and navigation system, communications gear, autopilot, etc.) used in the XB-58. Previously, this equipment was selected and furnished by the government.

If the new policy produces better aircraft in less time and at lower cost, as Convair and its Air Force advocates believe, it could shift the center of avionic and accessory equipment buying from AF to the airframe manufacturers.

▶**Logical Extension**—The USAF's F-102 supersonic interceptor program at Convair, San Diego, was the forerunner of the new procurement concept. Even before the airframe manufacturer was selected, Air Force gave Hughes Aircraft Co. complete responsibility for providing and integrating the interceptor's fire control, communications, navigation and other avionic equipment. Convair in turn was told to build its airframe around the Hughes avionic package. Air Force is the coordinating agency between the two.

The new policy goes a step further and transfers to Convair the responsibility for coordinating the XB-58 airframe, powerplant and avionic equipment. Some observers consider this a logical extension of procurement practices in the field of guided missiles, where a contractor frequently is given complete responsibility for the "bird." Aircraft industry practices in designing commercial airliners provide another precedent.

Convair has been a strong advocate of the new policy. Its president, Gen. Joseph T. McNarney (USAF Ret.), urged Air Force to adopt the present plan at an AF-industry meeting in Baltimore last December.

▶**Scope**—Broad outlines of the new policy call for Air Force to establish its military and tactical requirements for aircraft weapons, make top decisions and provide the resources. Convair is responsible for coordinating and managing the performance of the entire project, according to Esenwein.

From charts released by Convair, it appears the company will select and buy the XB-58's bombing, navigation, reconnaissance, fire control, autopilot and communication systems. The chart shows powerplants and off-the-shelf equipment in a slightly different relationship, suggesting USAF will continue to control development of engines and possibly such items as cockpit instruments. Company responsibilities are shown to include ground support, training equipment and logistics.

▶**The Need**—Usefulness of new bombers is being threatened by the growing gestation period required to develop and put them into production, Esenwein says. It took only 12 months from design study to the first B-24 flight test, but the same phase for

New Jet Pact

Westinghouse Electric Corp. has signed a 10-year agreement with Rolls-Royce, Ltd., Derby, England, providing for broad technical cooperation on jet engine development limited only by security restrictions imposed by the respective governments.

Reports that the Navy Bureau of Aeronautics instigated the agreement because the American company's jet engine development program has been lagging far behind schedule were denied by a Westinghouse spokesman, who told AVIATION WEEK that idea for the pact with Rolls-Royce originated with his firm.

An initial application of the agreement will be in obtaining Rolls-Royce's assistance on development of the J46 axial-flow turbojet, an engine that has been behind schedule.

The Westinghouse-Rolls-Royce pact also provides for manufacturing license agreements. Apparently these will involve only axial-flow developments and will not conflict with Rolls' earlier licensing of Pratt & Whitney on its centrifugal-flow powerplants. The new agreement probably will not include the licensing of any specific Rolls engine for U. S. production, although the British firm is anxious to sell for foreign production the latest version of its Avon, the R.A. 14, rated at 10,000 lb. thrust without afterburning.

the B-36 required 46 months, the division manager says.

Convair blames part of this growing lead time on the problems of integrating government-furnished aircraft equipment and tailoring it to a new airframe. For example, a bombing system may not be compatible with the autopilot with which it must work. This requires design changes in the sub-systems and/or compromises in performance.

When sub-system design changes previously were made, Air Force had to serve as the middleman between airframe and equipment manufacturers. This involved "compromises, conferences, and delays in approval of every design item from cowl fasteners to bombing systems," Esenwein says.

"With the advent of supersonic flight and with the advancement of the state of the art . . . we simply cannot attain the required performance when such compromises are made."

▶ **Fluid Procedure**—Air Force and Convair are "playing by ear" in setting up the operating rules for the weapons system management, and observers say the procedures still are fluid.

However, the USAF Joint Project Office occupies the key spot in the new procurement setup. JPO is Convair's single channel for communication to Air Research and Development Command, Air Materiel Command, Strategic Air Command or USAF Headquarters. When Convair needs a top-level decision, it will turn to the JPO.

Convair moved to allay any fears that its new weapons system manager role might take it into the equipment and component manufacturing fields. The company's new role "will not in any way jeopardize the existence of component manufacturers," Esenwein says. "We realized that the most rapid progress necessitated our using the top-drawer laboratories, technical designers, and manufacturers in their respective fields."

To find sub-system and component suppliers for its XB-58, Convair "launched the biggest exploratory mission of its type this company has ever conducted," Esenwein says. Teams of Convair engineers and procurement specialists visited large and small companies throughout the nation to evaluate their equipment and capabilities.

Esenwein sums up Convair's position this way: "We in the industry have felt for some time that, were we given a set of requirements for (a particular type of) . . . aircraft and left to our own devices to meet those requirements as quickly and economically as possible, we would be able to make substantial savings for the government in both time and money and at the same time would probably produce better end products."

Comet Crash Report Draws Fire

Indian government cites pilot overcontrol and severe turbulence as possible causes of structural failure.

(McGraw-Hill World News)

London—An official report from India last week on the crash of a British Overseas Airways Corp. Comet near Calcutta May 2—including suggestions for modification of the jet transport's control system—drew immediate rebuttal from operator and manufacturers.

BOAC and de Havilland Aircraft Co. issued a joint statement objecting to the preliminary findings of the Indian government court of inquiry.

The court's report cites two possible causes of the accident:

• **Severe gusts** encountered in a thundersquall.

• **Pilot overcontrol** or loss of control while flying through the thunderstorm.

It is quite probable, the report says, that the pilot overcontrolled the aircraft, imposing loads beyond design limits of the Comet. It suggests a modification of the jet liner's booster-operated control system to give the pilot a positive feel of loads exerted on control surfaces.

▶ **Structural Failure**—While recommending a detailed technical examination of the wreckage of the G-ALYV, in which 37 passengers and six crew members were killed (AVIATION WEEK May 11, p. 17), the court considers it highly probable that "primary failure of (an) elevator spar in bending" caused a sequence of structural failures to occur in the plane.

The elevator spar probably failed, the report says, when the pilot pulled up after encountering a sudden downgust during flight through a "Norwester squall."

▶ **Rebuttal**—BOAC and de Havilland Aircraft Co. objected to the findings, stating that until detailed examination of the wreckage—now going on at Royal Aeronautical Establishment, Farnborough, England—is completed, it won't be possible to determine sequence of structural failure.

"Until such sequence is determined," the statements says, "it is only possible to theorize on cause of the accident. The very considerable flying experience over the past three years by BOAC and de Havilland in Comet aircraft—including many flights in turbulent conditions—does not suggest that overcontrol or loss of control by the pilot was likely."

▶ **Positive Feel**—Nevertheless, the Indian court believed in its findings sufficiently to ask DH to consider modifying the control system, now operated by booster power with no feedback arrangement for pilot feel.

But de Havilland spokesman questions this suggestion.

"Lack of feel may be preferable in flying jets through turbulence," the company says. Experience has led de Havilland to this conclusion, and so far the British airframe manufacturer is the only authority with sufficient background to prove jet transport requirements.

▶ **Failure Sequence**—The Indian court suggests the following sequence:

• **Elevator spar** failed after pilot corrected for nose-down attitude caused by gusts. All four throttle controls were found in half-open position, indicating the Comet initially responded to corrective action.

"It is significant," the report says, "that this failure was of a localized nature, with no damage over surrounding area either in tailplane or elevator skin in spite of subsequent impact damage observed on other portions of structure."

• **Fuselage at frame 26**, close to and aft of center wing section, failed. This is said to have been caused by a down-load on the tail section.

• **Both wing and panels** outboard of the engines ripped off, a failure laid to the tremendous increase in gravity pull caused by the elevator spar collapse.

▶ **Torsional Loads**—Forward half of the Comet fuselage, with inner wing panels and engines intact, plunged upside down in a gully 24 mi. from Calcutta's Dum Dum Airport. Wreckage torn from the transport was strewn along a five-and-a-half-mile path.

There was evidence of fire after the Comet broke up, but the report says "examination didn't reveal any sign of lightning damage, faulty workmanship, defective material or powerplant failure."

In absence of design details, the court found it could not judge comparative strength of elevator members. But it did say the metal elevator does not have a closed-nose box to take torsional loads. "A triangular metal box aft of the spar forms, is in fact, the only torsion-resisting member of the elevator," the court reports. "Torsion will be resisted by skin panels in tension."

▶ **Storm Warnings**—Special warning was given at Dum Dum an hour before the Comet's flight departure time, saying a 50-knot thunderstorm was heading for the airport.

The pilot was fully briefed, but the report says "it would not be right to accuse the pilot of any imprudence in taking off despite warnings."

RCAF Shows Off Its First Comet

By George L. Christian

RCAF, Uplands, Ontario, Canada—The first passenger-carrying, production-type jet airliner to fly over the U. S. was Royal Canadian Air Force's shiny new de Havilland Comet 1A. On June 4, the speedy, vibrationless jet streaked from this RCAF base near Ottawa to New York in 57 min., carrying a crew of five and a capacity load of correspondents from press, radio and television (AVIATION WEEK June 15, p. 15).

►**Up and Down**—On the flight to New York, the Comet had time only to climb to 29,000 ft. before it had to start letting down to the 8,000-ft. altitude at which New York was overflown to give us a brief view of the city through broken clouds. On the 1:16-hr. return trip, the Comet soared to 37,500 ft. where the outside temperature was −67F, while the cabin was pressurized to a comfortable 8,000-ft. altitude and held at 78F. Here the Comet hit its top speed of the flight—450 mph.

As the craft approached Uplands through solid cloud banks, the wing dive brakes extended suddenly and the plane started a 3,000-ft./min. descent. Picked up by GCA, the captain, Squadron Leader J. D. Dickson, brought the Comet straight over the runway and set her down with ease, in spite of marginal ceiling and visibility.

►**No Chatter**—As so often reported, the Comet is vibrationless during flight. The cabin noise level varies from practically zero in the cockpit, where the loudest noise heard is the whine of the many radio dynamotors overlaid by the soft swish of air rushing past, to a resounding roar in the tail of the airplane. Most of the cabin is pleasantly quiet, especially the forward and middle compartments. The last two rows of seats in the third, rear compartment get as noisy as in perhaps a Convair or a jet-exhaust Constellation.

The aircraft's performance on take-off was of particular interest because of the two Comet accidents which had occurred when the plane was maneuvered to too high an angle of attack, keeping it from accelerating sufficiently to become airborne.

Engines were started only when take-off clearance was obtained from the tower. Two minutes were required to start all four powerplants. Plane was quickly taxied to the proper runway. The Comet is unusually well sprung, taxiing being particularly smooth, possibly because of the four-wheel bogie main gear configuration.

At the end of the runway, brakes were set, engines run up to full power (10,000 rpm.), brakes released and we were off.

Initial acceleration was sufficient to set you back in your seat a bit, but the sensation of acceleration did not nearly equal that felt in such planes as the Constellation or Convair 240.

Pilot held the Comet's nose on the runway after the plane started its run, easing it off after he had reached more than 80 knots. The plane, with a gross weight of more than 98,000 lb., became airborne after a 45-sec. run, somewhat longer than for a piston-engine craft. Less than half of the over-8,000-ft. runway was used. Unstick speed was 115 knots an hour.

After a slow initial climb-out period, the Comet settled down to a steady 1,200-ft./min. climb. At least one of the pilots was wearing an oxygen mask at all times; usually both had them on.

►**For Defense Too**—Air Commodore R. C. Ripley, Air Officer Commanding, RCAF Transport Command (operators of the Comet), told AVIATION WEEK that the two Comet 1As purchased by RCAF will not only carry VIPs, but will be used to exercise Canada's radar and fighter defense system.

Standard transports such as the North Star are too slow to simulate attack by enemy bombers. Jet fighters like the CF-100 and F-86 are fast enough, but too small to give the proper proportion on radar screens. But the Comet fits the bill almost ideally, RCAF says. It can fly high enough—40,000 ft.; fast enough—450 mph.; and has sufficient size to double for an enemy bomber.

No other aircraft that could fill these requirements was available or projected in early 1951, when the purchase decision was made, RCAF says.

The Transport Command expects its pilots to get skill and experience in operating large, commercial jet aircraft from Comet operations. This will pay off for RCAF as jets come into their own.

►**Thorough Training**—In October 1952, over 60 air and ground crew personnel of the 412th RCAF Transport Squadron were sent to England to get on-the-job training from de Havilland, Smith Aircraft Instrument Co. and British Overseas Airways Corp.

Training with BOAC included operating the first RCAF Comet, accepted on Mar. 14, to Singapore and Johannesburg, over the carrier's routes. The plane was ferried from London to Upland on May 29, via Goose Bay, in 10¼ hr., a new record for this type of plane.

Navigator's Log

Comet Flight: Ottawa-New York-Montreal-Ottawa

- Chocks away, Ottawa 15:30 local time
- Airborne 15:34
- On course 15:35
- Top of climb (29,000 ft.) 16:00; speed, 360 mph.
- Descended immediately to arrive over New York at 8,000 ft.; descent speed, 360 mph.
- Over New York 16:31
- Departed New York 16:39
- Climb to 37,500 ft.
- Top of climb 17:20; speed, 360 mph.
- Cruise for 4 min. at 37,500 ft. Speed 450 mph.
- Start descent to Montreal 17:24
- Over Dorval Airport, Montreal 17:37
- Cruised at 25,000 ft. between Montreal and Ottawa as a short holding period was expected at Ottawa ..... Speed, 450 mph.
- Over Ottawa 17:55
- Landed (under GCA) 18:10
- Engines off 18:15
- Connect times: Ottawa-N. Y. 57 min.
  N. Y.-Montreal ..... 58 min.
  Montreal-Ottawa ..... 18 min.
- Standard airline times:
  Ottawa-N. Y. ..... 1:55 hr.
  N. Y.-Montreal ..... 2:00 hr.
  Montreal-Ottawa ..... 0:55 hr.

CAB Plans Merger Ruling

Civil Aeronautics Board plans to complete the Flying Tiger Lines-Slick Airways merger case by Oct. 1—deadline set in the consolidation contract.

CAB has denied an American Airlines request to include in this case the question of Tiger and Slick certificate renewals next year. The Board says this would delay the merger case.

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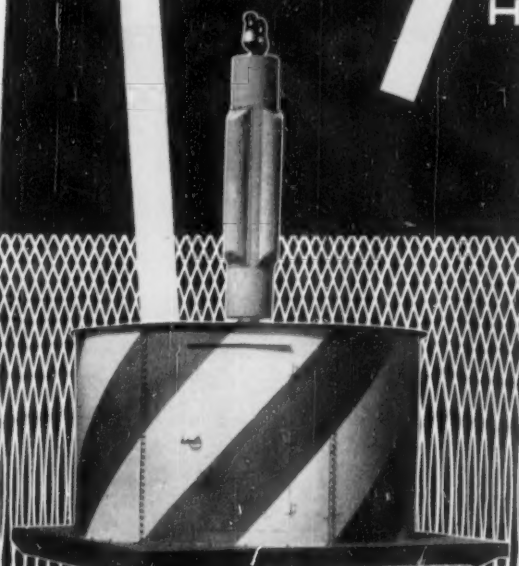

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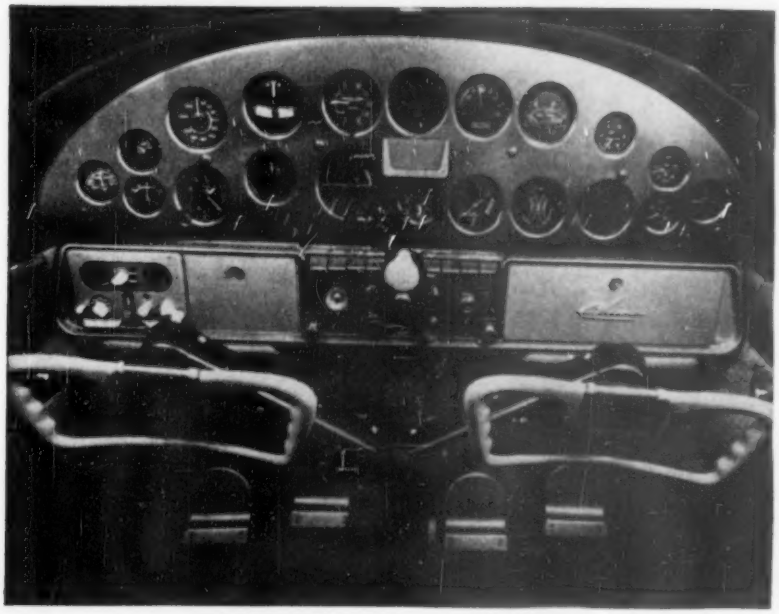
Italy's Fiat To Make 50 F-86Ds

(McGraw-Hill World News)

Rome—Arrangements have been made for "pilot" assembly by Fiat at Mirafiore of 50 North American F-86D Sabre all-weather fighters from parts shipped from the U.S., according to semi-official sources here. Production of spares by the same method is also contemplated, these sources report. This procedure will pave the way for production in Italy of the complete Sabre airframe.

The initial F-86D contract is said to cover approximately $22.5 million, including technical assistance charges and some $2.5 million for building in Italy the initial production equipment.

The U.S. is to order from North American Aviation, Inc., equipment and machine tools that cannot be made in Italy and will also supply the necessary General Electric J47-GE-17 turbojets, the armament, radar sets and other special materiel, these sources note. The U.S. is also to pay the costs of completing the first two F-86Ds built by Fiat. It is estimated that these expenditures will come to approximately $18 million. Added to other expenses, this will bring the total charges to U. S. to over $40 million.



CESSNA SHOWS NEW 195 FIVE-PLACER

Here is the latest version of the five-place Cessna 195 which can be fitted with Jacobs engines of 275 or 300 hp. It differs from earlier 195s in having a 50% larger wing flap, propeller spinner, relocated horizontal stabilizer with a redesigned elevator, and completely restyled interior. Note the new-type control wheels and the neatly laid out instrument panel. Other changes include foam rubber seats and an improved airspeed indicator system. Prices at the factory are $24,700 for 300-hp. model and $19,950 for the 275-hp. Jacobs version. Similar 190 with 225-hp. Continental costs $16,500.

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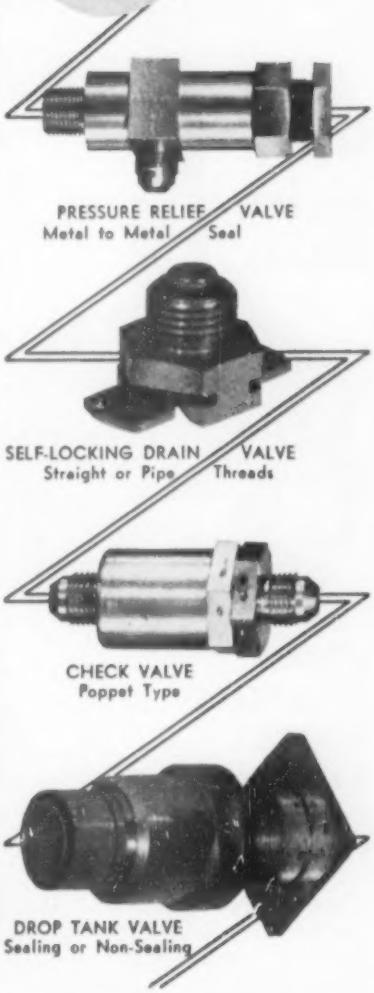

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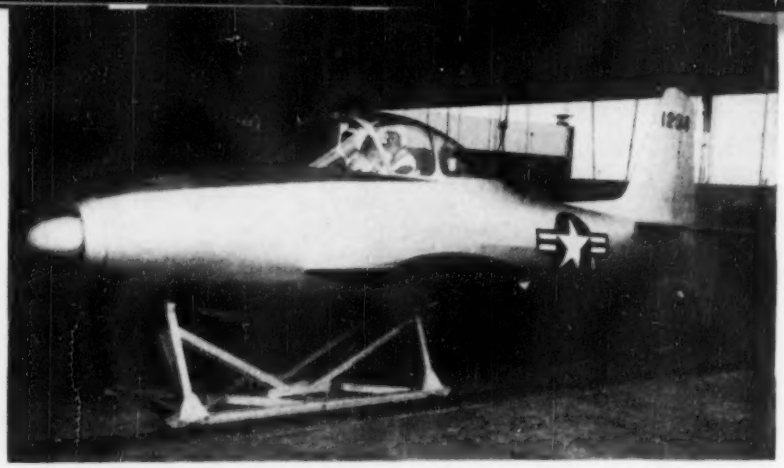


MOCKUP of Temco 27 fuselage shows craft's clean exterior lines. Full-scale wood model served to check instrument and control layouts.

Temco Experience With Turboprop . . .

Trainer Points Up Paper-to-

By Alexander McSurely

Some of the best airplanes never get beyond design stage. They look good on paper, but something happens —not particularly related to the airplane —and the customer changes his requirements. So the paper plane is hangared for keeps in a file cabinet drawer.

The case history of a trim little turboprop-powered plane—Temco Aircraft Corp.'s Model 27, which may be relegated to this kind of limbo despite some obviously advanced design features and its estimated top performance—offers some interesting sidelights on the multiple problems of an aircraft manufacturer.

▶ **Mamba-Powered**— Temco Model 27 turboprop trainer was designed to be powered with the proven British Armstrong Siddeley Mamba. Temco also had an alternate version of this airplane, Model 29, designed to be powered with the Allison 520-C-1 turbojet engine—a proposed development from the turbine section of Allison's T38 turboprop. The Allison turbojet is rated at 1,870 lb. thrust.

Some interesting design features:

• **By bolting** on wingtip extensions, the airplane could be used for two stages of training—for light wing loading with the extensions, and for "hotter" landing and higher performance with wings shortened.

• **Automatic rudder** trim arrangement would cut in and out to keep the needed control force constant as power increased or decreased.

FOUR-PLACE version of turboprop trainer is designed for military "staff car" use, but also has possibilities as a personal plane.

INTERIOR details of proposed Temco turboprop trainer are bared in this sketch. Note mounting of Mamba 6 engine with tailpipe passing beneath pilot's feet. Cockpit is mounted high providing good visibility in nearly all directions.

Metal Hurdles

• **Reduced power** for the light wing-loading version, while using the same powerplant as the more advanced short-wing version, would make economically feasible the light weight of the Mamba powerplant.

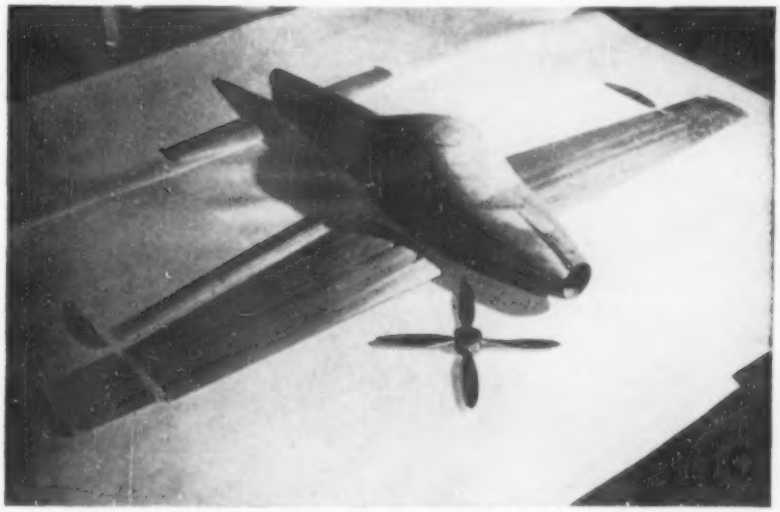
• **Smooth transition** from small piston-engine screening trainer to jets would be provided by the turboprop, with its more forgiving takeoff and landing characteristics. It also would provide transition to the type powerplant controls that are used in more advanced jet training.

▶ **How It Started**—Temco got interested in the trainer business with its small Buckaroo, developed from the two-place Temco Swift personal plane. After talking to many Air Force training command officials, instructors and trainees, Gus Erickson, engineering director, and W. W. Hurtt, chief of design, set out to design a new trainer to meet USAF requirements.

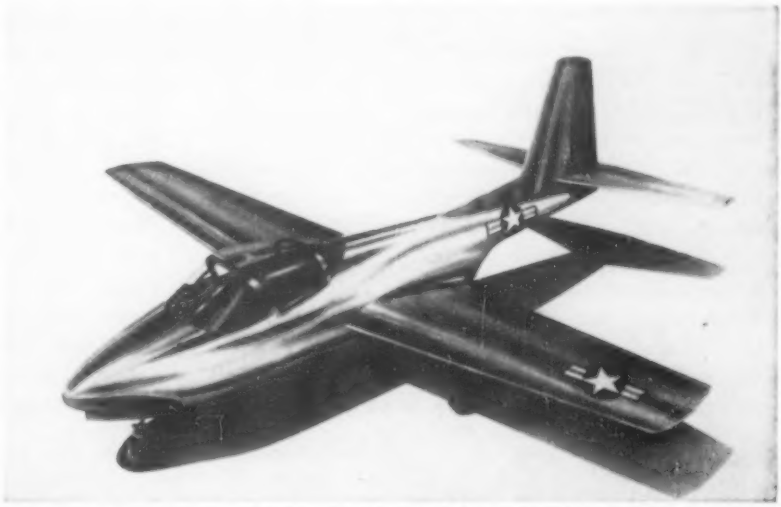
Late in 1951, the corporation submitted to the Air Force its proposal to build the Model 27. On the following April 15, AF issued its invitations for a competition to build the TX trainer with requirements quite similar in many respects to the specifications of the Temco airplane.

▶ **Windtunnel Tests**—Temco had carried on the Model 27 design project with tests of both the short-wing and long-wing configurations in Wichita University's windtunnel. Company also built a full-scale wood fuselage mockup of the design to test instrument and control arrangements.

Curtiss-Wright Corp., American licensee for the Mamba, loaned Temco one of the engines for planning purposes and Armstrong Siddeley engineers came over from England to work on the



WINDTUNNEL MODEL of Temco 27 shows how extra wingtip sections can be fitted, bringing down wing loading.



JET VERSION of turboprop trainer is designated Model 29 and is designed to take an 1,870-lb.-thrust Allison turbojet derived from T38.

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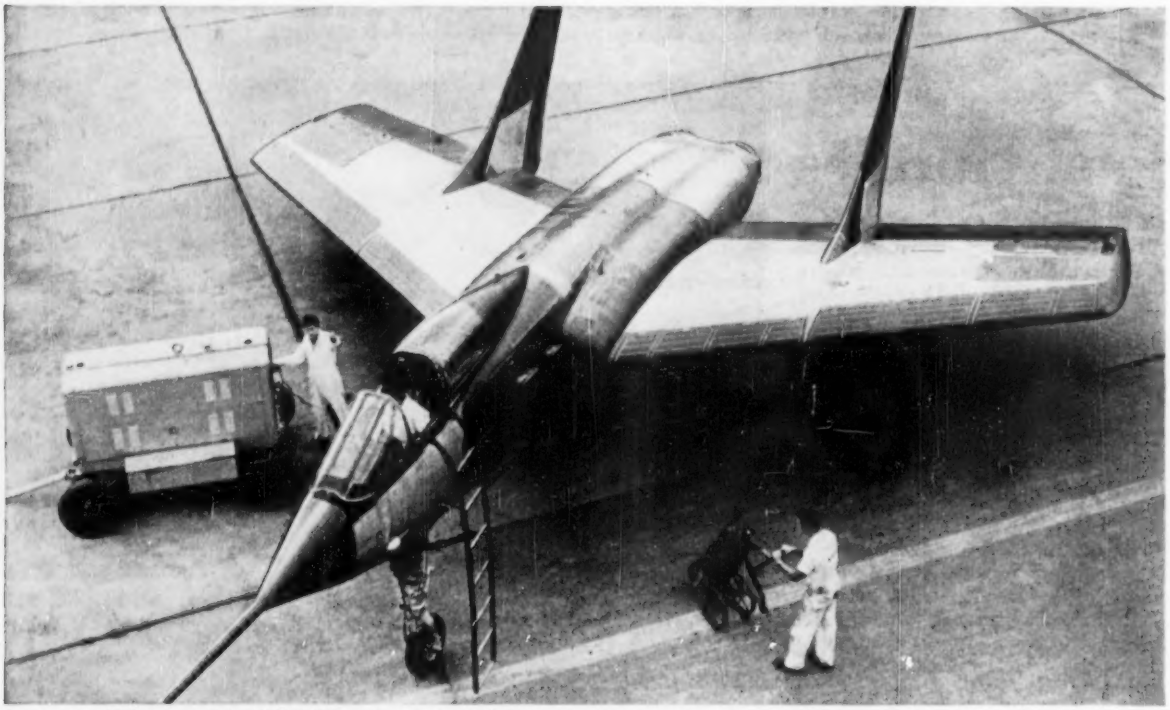

In this view of the F7U-1 Cutlass, the dark metal areas are magnesium, the light areas aluminum. The same extensive use of magnesium is made in the F7U-3. Not seen, but made of magnesium, are landing gear fairings and engine access doors.

Building planes that will fly greater distances without refueling is a challenge faced by the modern aircraft maker. To solve this problem many manufacturers use lightweight magnesium which lets them take on extra fuel and other equipment in place of the heavier metals originally used on aircraft.

As an example, take the F7U-3, the Cutlass—Chance Vought's faster-than-sound jet fighter. Forty-two per cent of its external skin area is magnesium sheet. In addition, magnesium is used in internal components, in numerous structural castings, in skin panels, in various supporting members, landing gear wheels, the pilot's ejection seat, as well as in castings in the jet engines. A total of 2,257 pounds of magnesium, 1,813 pounds of which is magnesium sheet, is included in the entire airframe weight. Weight saving up to approximately 250 pounds is made possible by the use of magnesium in this airplane.

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Temco Turboprop

Here is what Temco expected of its turboprop trainer in final form as submitted in TX competition:

	Light-Wing Version	Heavy Version
Takeoff 50-ft. obstacle	1,260 ft.	970 ft.
Climb sea level	2,500 fpm.	6,800 fpm.
Service ceiling	37,000 ft.	44,000 ft.
Cruising speed (True)	At 10,000 ft. 180 knots	At 35,000 ft. 296 knots
Gross weight	5,660 lb.	6,126 lb.
High speed	230 knots	316 knots
At sea level	845 eshp.	2,040 eshp.
Useful load	1,438 lb.	1,950 lb.
Range	2 hr. (sea level)	2.86 hr. (35,000 ft.)

project. Discussions finally resulted in a tentative agreement that Armstrong Siddeley would provide the first 100 Mamba production engines if Temco got a military contract, and Curtiss-Wright probably would produce the additional powerplants needed.

▶ **Cessna Wins**—But when the TX trainer competition award was announced, Temco found the turboprop trainer was not considered because Air Force had decided a purejet-powered plane was more suitable. The award went to Cessna Aircraft Corp.'s Model 318, powered by two French-design Marbore engines rated at 900 lb. thrust each to be built in the U. S. by Continental Motors Corp. (AVIATION WEEK Jan. 12, p. 15).

▶ **Temco Alternate**—Temco officials had heard some rumblings about the training trend to pure jet, so they proposed their alternate Model 29 with the Allison powerplant. They also proposed a four-place "staff car" version of the Model 27, which would have appeal as a personal or business plane if in production. But the company actually believed, and still does, that the turboprop trainer is the most logical for the transition projected.

Some Erickson and Hurtt arguments for the turboprop:

- **Specific fuel** consumption quoted at 0.68 lb./hp./hr. for the Mamba 6 is only about 50-60% as great as that of jet engines of equivalent thrust. This means either longer range or lower gross weight because of lower fuel need.
- **There is no sudden** differential in speed to confuse the trainee. With light wing-loading and heavy wing-loading turboprop versions, the differential stays constant as speed and altitude increase.
- **Hazards from aborted** landings and waveoffs are reduced by the turboprop's prompt response to increased power.
- **British have more** experience on the Mamba than is reported for any of the other powerplants proposed in the TX competition. More than 22,000 flight hours on the Mamba was quoted to Temco several months ago.

Presumably flight time is considerably higher now, since the double Mambas are flying in the British Fairey Gannett anti-submarine plane, and single Mambas are in several transports and trainers.

▶ **Wing Conversion**—To convert one of the Model 27 airplanes from short-wing configuration to the long wing:

Wingtip caps are removed; outboard extension sections would be attached by two vertical bolts passing through a spar fitting. Meanwhile, a spring-centering pin in the outboard aileron would be adjusted so that the outboard section automatically would align with the inboard aileron in response to controls. A geometric twist to the outboard extensions would carry out the twist in the inboard portion of the wings, resulting in better stall characteristics for the extended than for the short wing.

Other necessary changes would involve putting stops on the governor and restricting the fuel flow to cut down power available to the pilot, and sealing off high-level tank filler opening.

It is estimated that the wing change and the conversion steps could be accomplished in 6 to 8 hr. With the short-wing configuration, the trainer wingspan is 34 ft. 4.7 in.; with extensions, span is 40 ft. 10.3 in.

▶ **Mamba Performance**—Armstrong Siddeley has quoted the following performance on the Mamba 6:

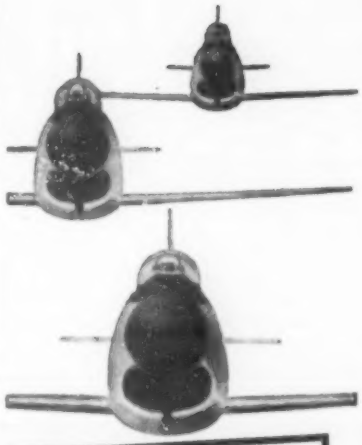
At 10,000 ft. at 100 mph. 1,175 shaft hp. and 135 lb. thrust; 108 imp. gal./hr.; at 300 mph. 1,410 shp. 37 lb. thrust; 117 imp. gal./hr.

At 20,000 ft. at 100 mph. 825 shp. 98 lb. thrust; 76.5 imp. gal./hr; at 300 mph. 1,015 shp. 27 lbs. thrust; 84.5 imp. gal./hr.

▶ **Jet Trainer**—Temco's jet version with the Allison 520-C-1 would have improved cruising speed, but takeoff and climb performance would have decreased and fuel consumption would have been higher. It was proposed with the same design philosophy, the same dual-wing configuration as the turboprop version plus installation of speed brakes in the wings, which would extend automatically if pilot reached his dive speed limit.

Gross weight would be about the same as that of the turboprop version, since weight saving through elimination of propeller and gearing in the jet would be compensated for in additional fuel.

Temco president Robert McCulloch has hinted to AVIATION WEEK that his company may go ahead and build the turboprop trainer to demonstrate how good it is.



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The Engineering Department which designed the **Sabre** and other headline-making military airplanes has openings for engineers—experienced in aircraft, recent engineering grads, or men from other fields with adaptable experience. Long-term military projects and twenty-five years of continuous expansion underwrite your future at North American. Current openings in:

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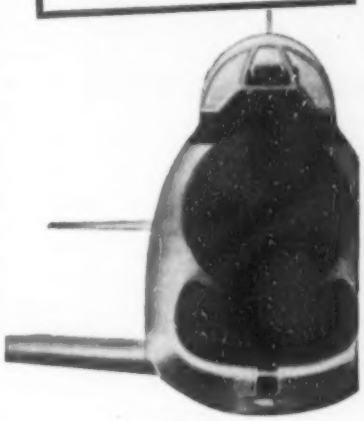

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LOS ANGELES 45, CALIFORNIA
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NORTH AMERICAN HAS BUILT MORE AIRPLANES THAN ANY OTHER COMPANY IN THE WORLD

Miss Cochran Holds Most Jet Records

Jacqueline Cochran last week counted up and found she now holds all but one of the principal world airplane speed records for straightaway and closed course flight as the result of her recent record flights at Edwards Air Force Base, Calif.

In addition, she has a new woman's altitude record of 47,300 ft. indicated altitude to her credit. West Coast reports indicate the veteran woman speed flyer may retire from record competition with the successful completion of this series of trials.

Flying a North American-designed Sabre jet F-86E built by Canadair, Ltd. and powered with an Avro Orenda engine, Miss Cochran racked up the following new international records, all subject to final official confirmation by the Federation Internationale Aeronautique:

- **June 3,** an uncorrected speed of 668.112 mph. over a 15-kilometer straightaway, expected to be corrected upward to more than 670 mph.
- **May 23,** a speed run of 590.321 mph. around a 500-kilometer closed course, with wingtanks installed for extra fuel.
- **May 18,** a speed of 652.552 mph. around a 12-sided 100-kilometer course.

Between the two latest record attempts, Miss Cochran climbed her Canadair Sabre to an indicated 47,300 ft. altitude record, and then dived it through the sonic barrier, the third time she has accomplished this feat. She is the only women who has flown faster than sound.

► **Nash Faster**—Only principal record not attained by Miss Cochran is the 3-kilometer straightaway record, held by USAF Capt. J. Slade Nash in a North American F-86D interceptor with a speed of 698.5 mph.

National Aeronautic Assn. contest director Charles Logsdon, chief timer for the Cochran trials, pointed out that she now holds both propeller-driven and jet plane straightaway and closed course records, as well as straightaway and closed course records for women.

Miss Cochran said that her full fuel load without wing tanks in each flight was sufficient for 17 min. at full power, and that she was burning about 1,200 gal./hr. and attaining thrust equal to approximately 11,000 hp. All flights except the altitude flight, were at levels between 200 and 700 ft. above the ground.

At the end of each flight she had less than two minutes fuel left when her wheels touched down for landing. In the 15-kilometer straightaway run, fastest of the record flights, a fuel tank leak made it necessary for her to cut off the engine and make a dead stick landing on the huge Muroc Dry Lake Field.

Australian Jets Hit Production Snags

(McGraw-Hill World News)

Melbourne—Delays in Australia's aircraft production plans are pointed up by late tests of the first Australian-built Canberra medium jet bomber and failure of a prototype Avon Sabre jet fighter to come off production lines.

The Canberra, originally scheduled to take off some time in 1952, was tested successfully at the end of last month. Royal Australian Air Force plans to put a jet bomber squadron in operation by the end of 1953 apparently will be changed because it is technically impossible to incorporate all modifications called for by test results and, at the same time, speed up production.

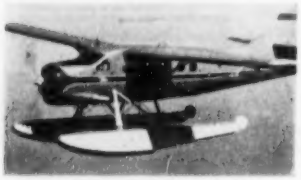
Another setback in Canberra production is delay expected in Commonwealth Aircraft Corp. output of Rolls-Royce RA7 Avon turbines, scheduled to replace the RA3 in the Australian-built bomber.

Prototype Sabre was scheduled to be flight tested some time ago, but CAC still is introducing changes during production of the initial jet fighter.

NEWS Edo NOTES

Piper Super Cub, 2-place utility craft on Edo Model 2000 floats

Cessna 180, 4-place, cruises over 135 mph on Edo Model 2425 floats.



De Havilland Otter carries up to 12 passengers on Edo Model 7170 floats.

EDO FLOAT PRODUCTION STEPPED UP

Never before have floatplanes been available with such excellent performance and utility. From the 2-place Piper Super Cub to the 12-place de Havilland Otter, there's a seaplane to suit virtually every water flying requirement.

These latest planes on Edo floats, have performance and load carrying ability which makes water operation even more attractive for commercial and for pleasure purposes. Advances in aerodynamic design, addition of flaps, higher power and generally improved performance have meant seaplanes of unusual utility, load-carrying ability and generally excellent water handling characteristics.

To meet the demand which the increased use of these airplanes on water has created, Edo has stepped up commercial float production 50% above a year ago. As a result virtually immediate delivery can be made on most Edo float models.

For 28 years, Edo all-metal floats have been known throughout the world for the quality of their workmanship, their rugged construction and ideal performance. In Canada: McDonald Brothers Aircraft, Winnipeg.

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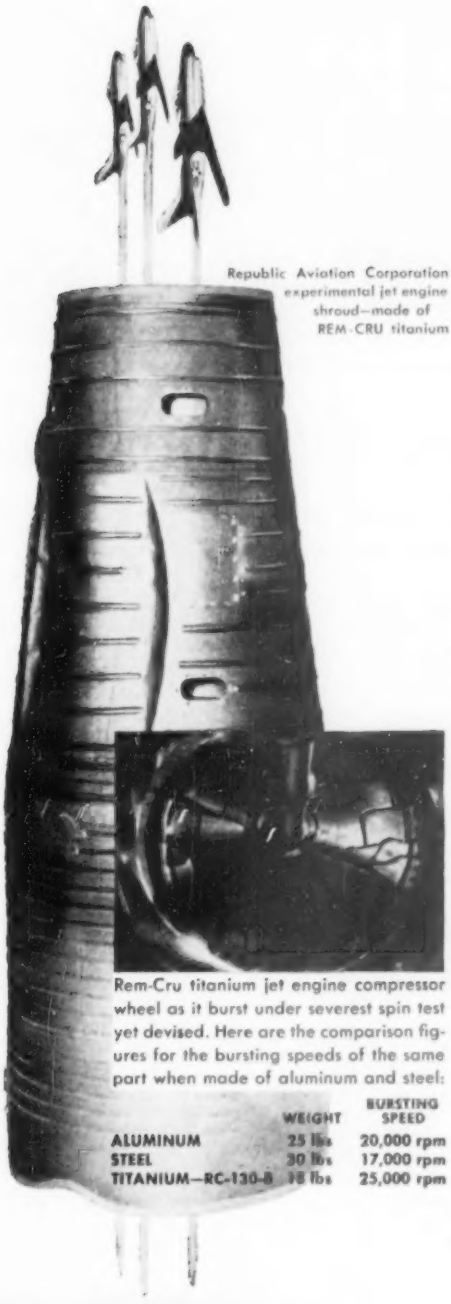
REM-CRU TITANIUM

facts for the aviation industry about this vital NEW metal



Republic Aviation Corporation experimental jet engine shroud—made of REM-CRU titanium

Rem-Cru titanium jet engine compressor wheel as it burst under severest spin test yet devised. Here are the comparison figures for the bursting speeds of the same part when made of aluminum and steel:

	WEIGHT	BURSTING SPEED
ALUMINUM	25 lbs	20,000 rpm
STEEL	30 lbs	17,000 rpm
TITANIUM—RC-130-B	18 lbs	25,000 rpm

TITANIUM is a natural for aviation. Its high strength, light weight and resistance to heat and corrosion are qualities that solve many design problems in modern aircraft. That's why practically the entire production of this metal goes into airplanes. Here are additional facts . . . presented by REM-CRU TITANIUM, INC. —a principal producer of the new engineering material.

Advantages —Titanium has a strength-to-weight ratio that is superior to other aircraft structural materials. Where it is substituted directly, section-for-section, in place of stainless steel, a 40% saving in weight results. It is remarkably corrosion resistant and is completely unattacked by sea water and marine atmospheres. It retains useful strength up to 800-1000F.

Applications —The commercially pure grades are best suited for airframe and engine parts not subject to high operating stresses—fire walls, shrouds, cowling, bulkheads and various forged parts. Skin sections of supersonic units take full advantage of titanium's unique properties. Alloyed titanium is used for structural members, compressor wheels, bolts and other highly stressed parts.

Availability —REM-CRU is producing four grades of titanium on a tonnage basis. RC-55 and RC-70 are commercially pure grades, having minimum yield strengths of 55,000 and 70,000 psi, respectively. These grades are available in all standard forms—sheet, strip, plate, billets, forgings, bars, rod, wire and tubing. RC-130-A is a titanium-base alloy with a minimum yield strength of 110,000 psi, combining high strength with good ductility. It is furnished primarily in sheet form. RC-130-B is a titanium-base alloy having a minimum yield strength of 130,000 psi. It combines high strength with good forgeability and is available in all standard sizes of bars, billets and forgings.

To keep abreast of the latest developments on this vital metal, write for the Rem-Cru Review—a free periodical devoted to the application and fabrication of titanium alloys.

REM-CRU TITANIUM REM-CRU TITANIUM, INC., MIDLAND, PENNSYLVANIA

NAGLER CONVERTICRAFT mockup shows rocket-rotor conversion of lightplane to autogyro; extra cost is estimated under $2,000.

Rockets Breathe New Life Into Autogyro

Nagler proposals include lightplane conversion and one-man strap-on units for vertical envelopment use.

By David A. Anderton

There's a lot of life left in the autogyro yet, says Bruno Nagler. All you've got to do is bring it up-to-date with rocket propulsion for the blades.

Nagler has done just that, and his Nagler Helicopter Co., Westchester County Airport, N. Y., is readying a flight test vehicle—basically a converted Aeronca—to take the air in a couple of months.

Also in the works is a one-man portable Heliglider, a rocket-propelled rotor system for the new military idea of vertical envelopment. With the Heliglider, each fighting man can have his own transportation, a mobility which was lost when cavalry was abandoned.

Looking to the future, Nagler's outfit has stepped up the pace on the development of a four-place pusher aircraft. It will use the rocket-rotor system for direct lift and the autogyro principle for steady lift during normal flight. Plans call for an engine in the 165-hp. category. The fuselage will be built of laminated glass-plastic material. Nagler believes that there is a market for such an aircraft, and that the selling price can be made low enough to attract that market.

▶ **First Showing**—At the recent International Motor Sports Car Show, Nagler exhibited two mockups of his designs. One was the Converticraft, a converted Aeronca lightplane, and the other was the Heliglider.

In both designs, Nagler has used the autogyro principle—where lift is produced by rotating blades that are driven solely by aerodynamic forces—to produce steady lift during flight. He has added to this the helicopter principle—where lift is produced by rotating blades driven by a power source other than the aerodynamic forces— to get the vertical lift features of the copter.

The Heliglider is capable of only gliding flight; there is no power unit for forward propulsion. The converticraft uses the more conventional autogyro approach and keeps the propeller of the basic lightplane for propulsion in forward flight.

Basic lifting unit is the same for the two designs, and consists of a rocket-driven rotor. Nagler explained the system and some of his plans in an exclusive interview with AVIATION WEEK.

The unique feature of the Nagler rocket-rotor system is that the motors are not tip-mounted, but are arranged radially in a group of six or more at the rotor hub. These rockets, each about the size of a quart milk bottle, are fired in pairs—one rocket motor for each blade—into a manifold. The exhaust gas mixture blasts through the manifold, which is inside the wing rotor blade, and discharges through a supersonic nozzle at the tip.

Nagler says the rockets for the Heliglider deliver about 20 lb. of thrust each for a durationof about 20 sec. The fuel is a solid-propellant combination. The rocket motor design and production is being handled by the Aerojet Engineering Corp., prime supplier of Rato units to the armed services.

▶ **Lifting Unit**—The rocket-rotor system is basically a lifting scheme, says Nagler. With it, you can lift a weight cheaply and efficiently and more rapidly than with a conventional helicopter. Further, you can do this with a lighter powerplant, because the rocket has the highest power-weight ratio of any known source.

So this leads into two development paths, Nagler points out. One aims at providing transportation on an individual basis over short ranges, for the military advantages which can be gained from such transportation.

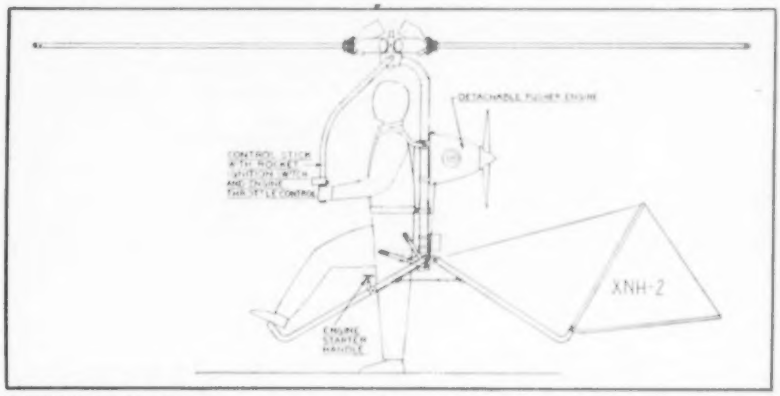
The other suggests the combination of the rocket-rotor with the long-neglected autogyro principle for conversion to or construction of an inexpensive convertiplane.

Nagler and his company have progressed down both these paths.

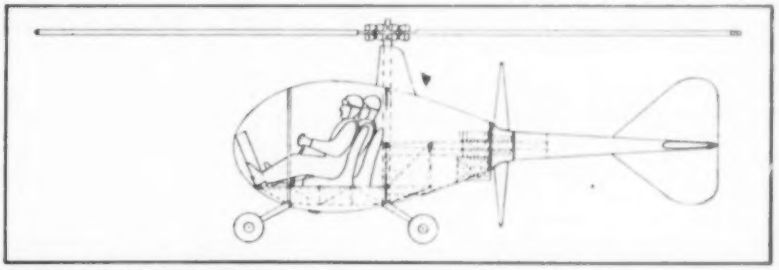
▶ **One-Man Unit**—The more spectacular of the two designs is the Heliglider, the strap-on lifting unit designed to hoist a man rapidly and set him down gently a few miles away.

For 65 lb., you would get a gadget which will whisk you off the ground at a 2,700-fpm. rate of climb, and carry you about five miles from a 2,700-ft. ceiling.

ONE-MAN HELIGLIDER shown in drawing would use rocket-rotor for climb.



DESIGN PROPOSAL for one-man units adds pusher engine for level flight.



FUTURE DEVELOPMENT of pusher aircraft could follow along ideas of this sketch.

As you approach for a landing, an automatic altitude switch fires the landing rocket—a smaller unit than those used for climb—to give a little extra lift for the autorotative descent. Incidentally, if this doesn't work, there is a manual control for increasing the rotor pitch to get some flare-out.

As you touch down, a landing switch fires deceleration rockets—tiny units placed one at each wingtip. These brake the rotor to a standstill.

Then you can fold the Heliglider for easy transportation, or if necessary, abandon it on the field. It isn't expected to be a very expensive unit.

▶**Flight Path**—Acrodynamically, the glide phase of the flight corresponds to any autorotative glide of an autogyro. Landing is the same as an autorotative descent. But with a disk loading of about 1.6 psf., the rate of descent is about 29 fps.

Simple tilting of the rotor disk provides control during the glide phase from ceiling altitude.

Queried about possible effects of corrosion from the rocket exhaust blast, Nagler explains that with the present layout, corrosion is only slight. "After 100 shots or so, you can clean out the manifold with a ramrod," he says.

Furthermore, Nagler feels that new developments in stainless-steel bellows-type flexible tubing and refinements of the rocket motors will virtually lick the corrosion problem.

Repowering the Heliglider is done

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(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

Whittaker field service engineers say theirs is the "Misery" Department.

"Nothin' but trouble!"

They operate under the field engineering department, and they figure their job as combination trouble-shooting and trouble-prevention. No matter where the fault lies, the first job is to correct the difficulty, and then to determine if it's an individual or pattern problem.

It's much better, of course, if a problem can be detected early. To this end the Whittaker men make regular rounds of key bases in the Air Materiel Areas. If trouble has cropped up, they dig into it immediately before it can mushroom to the "panic button" stage and the grounding of a flock of aircraft.

Evidently "trouble" is an occupational cross that must be borne, for there never was an airplane built that didn't show up with bugs of some sort.

Equipment and accessory manufacturers can design a unit right smack on spec to the point where it performs beautifully in test. Then, when it has been in the field for several months, it may malfunction because of unforeseen operational stresses, excessive vibration, fuel and oil variations, overload pressures, temperature extremes never anticipated.

It might be the manufacturer's error. Or it might be the result of faulty handling, installation or maintenance. It might even be a matter of misinterpreted nomenclature.

In any case, there's misery.

Upon arrival at an Air Base, the service engineer first contacts the aircraft manufacturer's resident rep, and the problem is given preliminary analysis. If the solution is routine, it's handled on the spot. If it goes deeper, reports are immediately phoned in to the home office personnel, who in turn contact the prime contractor.

Or the ball can get rolling in the opposite direction, from the resident rep to the prime to Whittaker. But it ends up in a joint operation, however it starts.

In all cases of major trouble, a field service man from the Whittaker home plant is sent to the scene to help in the study, and his progress reports and recommendations are given immediate action.

Whittaker engineering is consulted and the problem is given top priority until a fix is found, tested and proved to the satisfaction of the prime contractor and the Air Force or Navy. Then the job goes to a special re-work department – also with top priority.

Many times Whittaker has returned re-worked units within 24 hours once the fix has been assigned to the special modification lines. At other times it has been more feasible for the service bases to do the work themselves and Whittaker has promptly supplied them with kits to do the job . . . and when necessary, field service engineers are sent out to supervise it.

Who pays for all this?

Usually it's Whittaker . . . and I'd like to point out that although the valve company's warranty covers only a guarantee that their products are free from defects in workmanship and material, they have on numerous occasions assumed financial responsibility in cases where the fault lies not in the valve, but in the unforeseen and excessive rigors to which it has been subjected.

The big goal is to clean up the miseries as fast as possible.

Directed by **Tom Loughan,** Whittaker's Chief field service engineer, this department works on an age-old principle of customer service. The gimmick they add is a speed and coordination that cannot be easily matched by suppliers anywhere.

The valve company long ago recognized the extreme importance of quick and efficient action when the miseries appear. It's the only answer to the unforeseen problems that must follow inevitably in the surging wake of aviation's progress, the only way to keep airplanes airborne, to keep customers happy.

by taking off the empty rocket units and replacing them with loaded ones. The empties can be reloaded.

▶ **Aeronca Conversion**—Nagler says the mockup shown at the sports car show was intended to be representative of the type of conversion which would be available to the owners of lightplanes.

Nagler's company will make the conversion, at a cost currently estimated at about $2,000. They will remove the wings and install the rocket-rotor unit.

The owner will get back an aircraft which has the vertical takeoff characteristics of the helicopter and the level-flight, glide and landing performance of the autogyro. Cost to him will be only 25% or so of the basic cost of the airplane when he bought it.

Disk loading of the conversion will be somewhat higher than that of the Heliglider, and is currently pegged at 2.1 psf. Lift-drag ratio of the finished product will be between 7 and 8, which means a glide-path slope of one in seven or one in eight.

The first conversion is well underway and is expected to be ready for flight within a matter of weeks.

▶ **Who Is Nagler?**—The rotary-wing field is no strange area to Bruno Nagler. He has been doing research and development work in a variety of directions for more than 25 years.

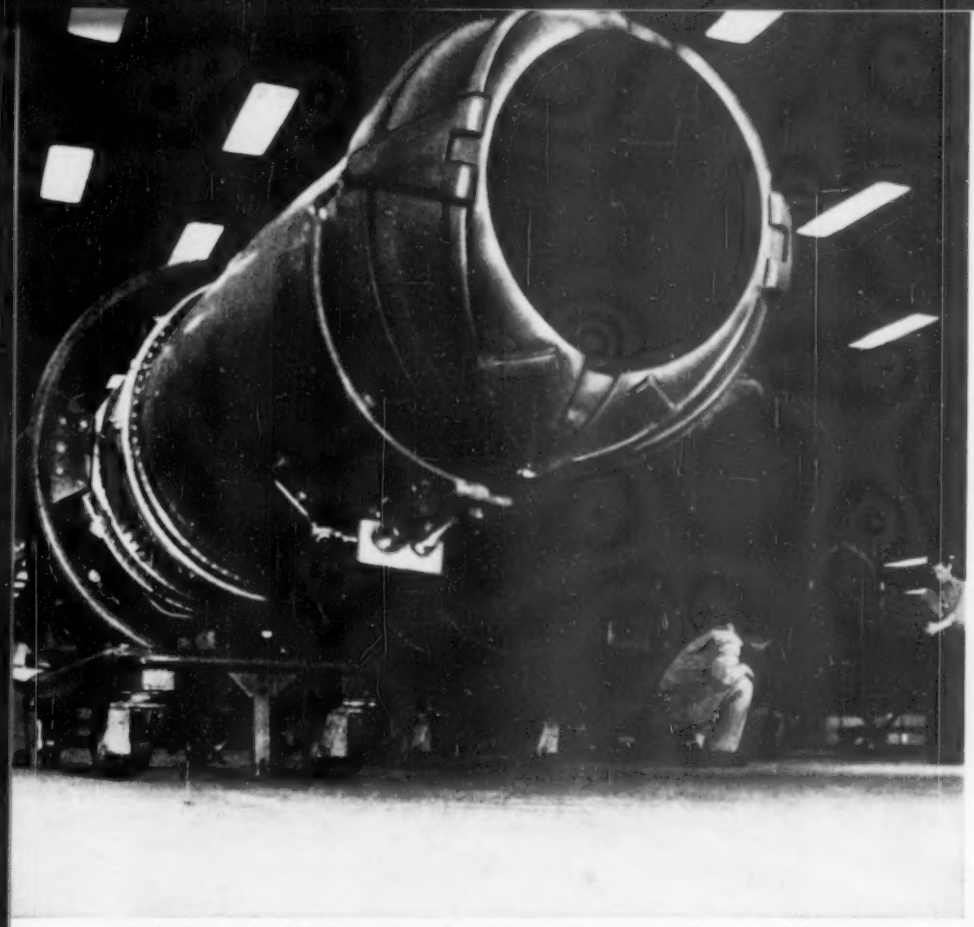
He shares a basic patent for swashplate control with Raoul Hafner, now chief rotary-wing designer with Bristol in England, which dates back to application in 1930 and granting in 1933 in Austria and the U.S. A later patent for the "spider" rotor-blade control system (shared with Hafner and Rutherford) was granted in 1937.

Along the line, he designed and supervised construction on six different approaches to rotary-wing craft; all flew successfully.

Some of his other accomplishments include designing and building a two-bladed steel rotor in 1935, the development of a single-bladed rotor with an engine as counterbalance in a stub blade, and the development and flights of the Heligyro, a rotary-wing craft with powered rotor and pusher engine which flew in 1937.

Nagler worked in Germany on one-man units for vertical envelopment tactics during World War II. In 1946 he started work on the Heliglider unit, and in 1951 was brought to this country at the request of the U.S. Army to direct the development and production of some of his ideas.

The present company—Nagler Helicopter Co.—is reorganized from the original firm created two years ago by Nagler. The firm has leased space at Westchester County Airport for engineering headquarters and the construction of prototypes. Current capitalization of the company is $1.1 million.



"CLAMSHELL" on J47-GE-17 afterburner (above) opens in response to G-E electronic fuel control.

What makes a great jet engine . . .

G-E Electronic Fuel Control System Allows One-throttle Thrust Selection

General Electric's new electronic fuel control system makes *complete, accurate fuel control* possible for all jet engines equipped with variable area "discharge nozzles."

A pilot whose plane is equipped with the system can set his throttle at any altitude to obtain a specified engine speed. *Without throttle readjustment,* he can then climb or descend as his mission requires. The system will automatically maintain the same engine speed. The system includes:

- A built-in deceleration control that permits quick "slow-downs" without danger of a flame-out.
- A minimum idle-speed that limits engine speed to a value above the flame-out level, a value from which rapid acceleration is still possible.
- A design that allows push-button starting, if required.

What makes a great jet engine? One answer is quality component parts. For more information on G.E.'s electronic fuel control system, adaptable to almost any afterburner engine's requirements, contact your G-E Aviation Specialist. Or, write *Section 210-72, General Electric Company, Schenectady 5, N. Y.*

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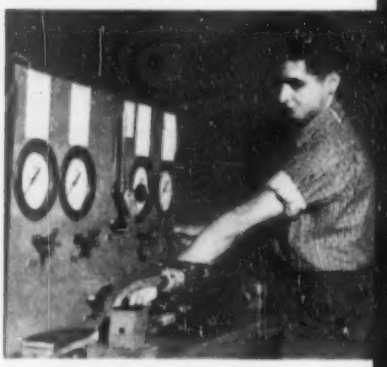
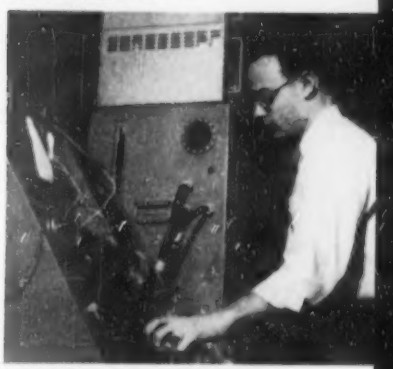


COMPONENT TESTS contribute to final, reliable system flight-performance. On above test board, nozzle actuator undergoes performance check.



SYSTEM TESTS put assembled components through "hot" engine conditions, to insure dependable operation in flight.

FINAL INSTALLATION in J47-GE-17 engine for North American F-86D Sabre Jet comes after hundreds of tests to insure fuel-control accuracy.

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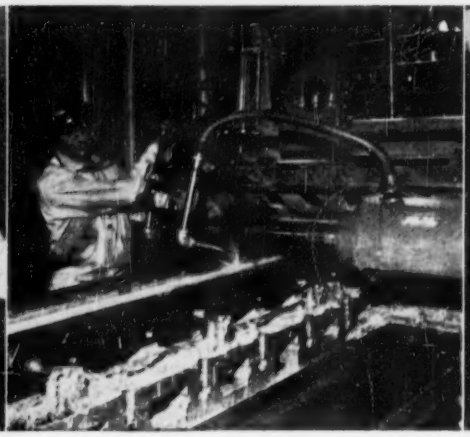

TWIN COACH AIRCRAFT DIVISION is currently delivering major airframe assemblies for helicopters, bombers, search and attack planes, fighters and triphibians.

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Gross Sees Avionics Importance Growing

A new air power concept is in the making in which "the guidance elements, the tracking devices, the computers, the communications systems" will be "of equal or greater importance" than the airplane itself, says Robert E. Gross, president of Lockheed Aircraft Corp., Burbank, Calif.

The need for weapons systems embraces not only interceptor planes or missiles, Gross says, but such allied devices as ground radar and ship and plane radar pickets. This is developing the guidance industry as a whole new segment of aircraft manufacturing.

Gross made these points before 150 business and industry leaders at a recent gathering of the Commercial Club of Chicago. Industry observers are particularly interested in his comments because Lockheed at present does no avionics manufacturing but is reported negotiating for purchase of Hughes Air craft Co.'s avionics business (AVIATION WEEK May 25, p. 14).

New guidance systems are leading to development of a drastically different concept of air defense and are also the key to the shape of future aircraft, Gross noted. He believes that military airplanes first will develop into more or less automatic craft in which the pilot does much less than he now does, next into uninhabited craft resembling present planes, then to a cross between a projectile and a guided missile. In this evolution process, the plane itself will become less important as a unit of air defense.

U.S.-India Air Agreement Stymied

(McGraw-Hill World News)

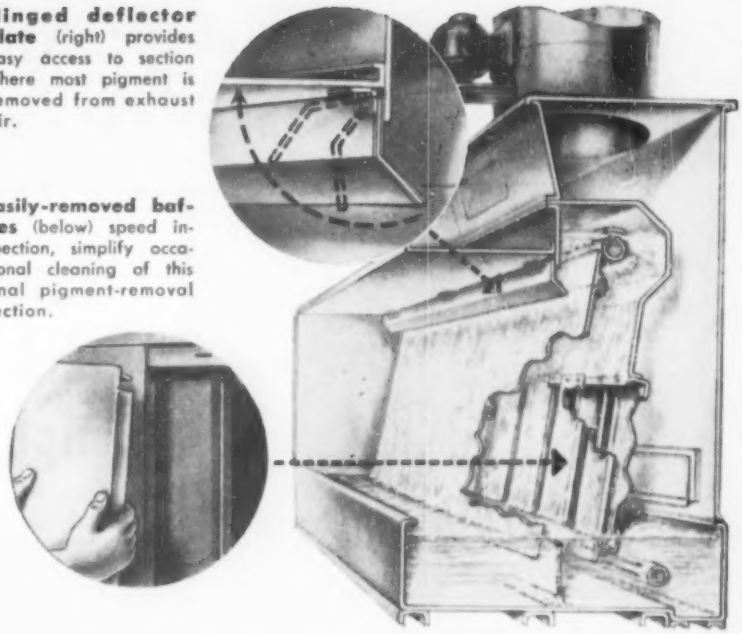
Bombay—Discussions between the U.S. and Indian governments on whether Pan American World Airways services to Delhi and Calcutta can be increased or should be decreased appear to have reached a stalemate. PAA now touches both these cities three times weekly. The Indian government wants one or the other of the stops eliminated; the U.S. is seeking to have the frequencies upped.

Northrop Sells School, Boosts Missile Output

Northrop Aircraft, Inc., has sold its aeronautical institute at Hawthorne, Calif., and will take over the school buildings for expansion of aircraft and missile research and production. The Northrop Aeronautical Institute was

Hinged deflector plate (right) provides easy access to section where most pigment is removed from exhaust air.

Easily-removed baffles (below) speed inspection, simplify occasional cleaning of this final pigment-removal section.



NEW Spray Booth lowers maintenance costs

The enemy of economy in most spray booth installations is time-consuming cleaning. But now, with these time-saving features of Binks new DUC Water-Wash Spray Booth, you'll at last find the cleaning ease you've hoped for:

Binks DUC Water-Wash cuts cleaning time because it prevents build-up of pigment on booth surfaces. Through sudden changes in direction of air flow, centrifugal force flings pigment out of the air. Water flushes virtually all pigment into the pan at the base of the booth for easy removal.

Binks DUC Water-Wash cuts cleaning time by eliminating difficult maintenance procedures. As the illustrations show, the deflector plate swings back and the baffle plates come out without tools to provide swift accessibility to the major sections of the booth.

You'll save money other ways, too. The DUC saves floor space, uses the same water over and over again. And Binks guarantees that every DUC installation exceeds the requirements of fire, health and state authorities.

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Describes the 7 major advantages this booth provides to save you time and money. Facts backing each claim thoroughly explained with pictures and sketches. See your Binks industrial distributor or send in coupon.

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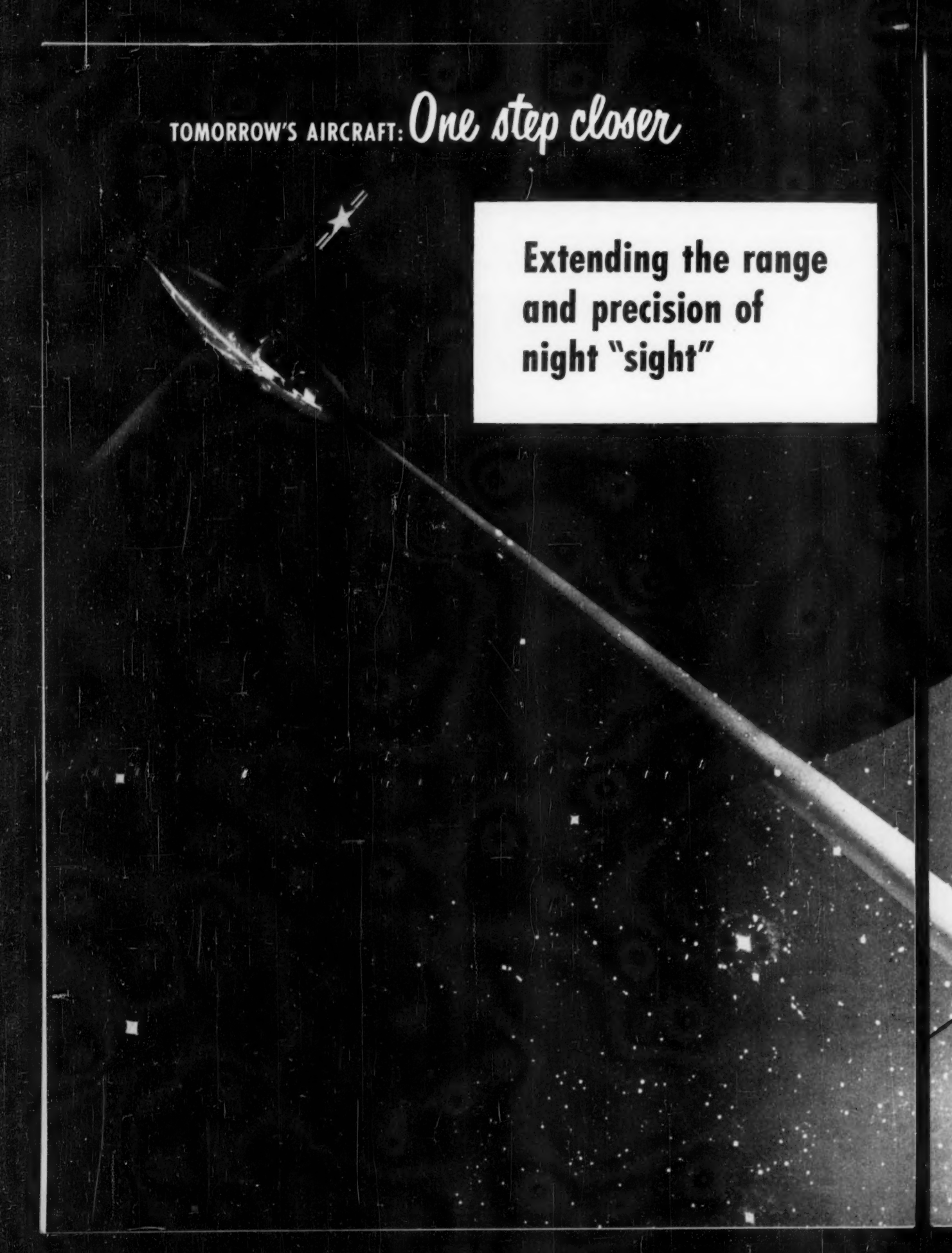
TOMORROW'S AIRCRAFT: *One step closer*



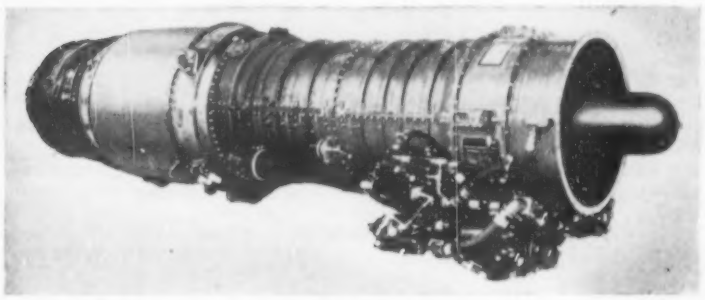
Extending the range and precision of night "sight"

Westinghouse has added a deadly punch to military aircraft with exceptionally accurate electronic "eyes" which can seek out opponents under the toughest visibility conditions.

The Intercept and Fire Control Radar detects a target and permits the pilot to identify it as friend or foe. When necessary, the system presents continuous, pin-point fire control information. The same radar guides the pilot safely back to his base.

Westinghouse Radar and Fire Control Systems are being used in the U. S. Navy F3D Skynight and have been proved under combat conditions by confirmed victories during night and all-weather operations. Making this product do the job required specialized technique and ability to develop highly accurate and reliable air-borne equipment, yet surmount critical limitations of space, weight and power.

These results come from the Westinghouse wholly owned Air Arm Division, with its twelve years of air-borne radar experience and unparalleled facilities for complete development, production and flight testing. The Air Arm's new plant at Baltimore's Friendship Airport produces the Autopilot, complete fire control system, computers and guided missile components and systems. By concentrating its extensive capabilities on advanced Avionic applications, Air Arm brings tomorrow's aircraft One Step Closer. J-91007



Westinghouse has brought a two-fisted punch to the F3D Skynight—all-weather fighter. It uses two J-34 turbojet engines developing over 6800-lb. thrust, powering it to operational speeds in excess of 500 mph.

THE SCOPE OF WESTINGHOUSE IN AVIATION

Basic aircraft systems

Turbojet Engines, Fire Control, Radar, Autopilots, Communication Equipment and Electrical Systems.

Ground equipment

Wind Tunnels, Airport Lighting, Industrial Plant Apparatus.

Air-borne system components

Transformers, Rectifiers, Instruments, Gyro-motors, Temperature Control Panels, Generating Equipment and System Control, Circuit Breakers, Contactors, Motors, Actuators and Hoists, Electronic Tubes, Magamps, Micarta®.

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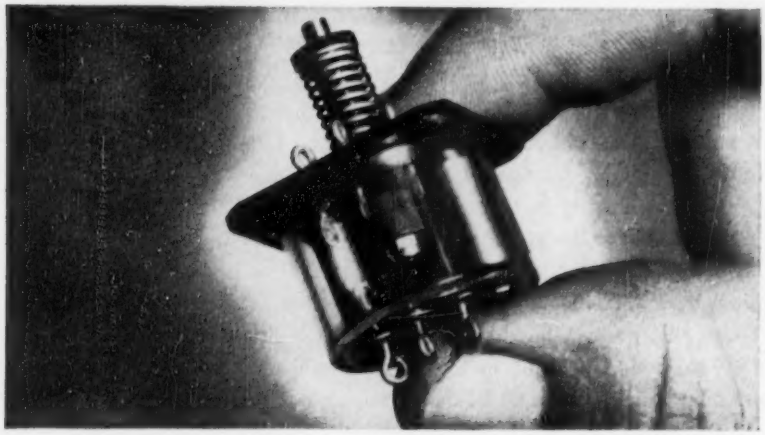
Westinghouse

FASTENER PROBLEM

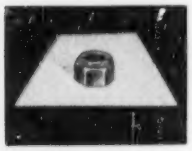


1½ times actual size

Installed fastener cost in displacement transducer 50% less with miniature ELASTIC STOP® nut

A new miniature displacement transducer has recently been announced by Colvin Laboratories, Morgistown, N. J. Installed on guided missiles, it relays mechanical actions into electrical impulses which are read on ground instruments.

On earlier models, Colvin had to make their own split nut for this application. To prevent loosening, it was cemented in place. With the miniature ELASTIC STOP nut, installed cost is *50% less*. In addition, the small dimensions of the nut made possible a related miniaturization of component parts resulting in an important weight saving. Tests have also indicated that the new assembly is stronger, and better able to withstand vibration.



Miniature nut shown twice actual size.

Nylon inserts make these miniature nuts self-locking, vibration-proof and reusable, like all ELASTIC STOP nuts. They are smaller than any other self-locking nut, yet maintain a precise adjustment, whether tightened against a seating surface or positioned at any point on a threaded member. They are simpler and less expensive to assemble than double nuts or soldered units.

Miniature ELASTIC STOP nuts are available in sizes #0 through #4 and watchmakers' standards #00, 1, 2 and 3. Mail coupon for design information.

ESNA

Dept. N42-625, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information:

☐ Samples of miniature ELASTIC STOP nuts ☐ Here is a drawing of our product. What self-locking fastener would you suggest?
☐ ELASTIC STOP nut bulletin

Name _____ Title _____

Firm _____

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bought by California Flyers School, Inglewood, Calif.

James L. McKinley will retain his post as managing director of NAI under the new management, headed by Leroy S. Jarrett, president of California Flyers. The combined operation, McKinley says, will continue under the name Northrop Aeronautical Institute at Inglewood.

Northrop formed its technical school during the early days of World War II and since has graduated aeronautical engineers, aircraft and engine mechanics. Under California Flyers, 700 students will be enrolled, approximately two-thirds of them in aeronautical engineering. Formal move to Inglewood was to begin June 19, with classes at the new location starting July 6.

THRUST & DRAG

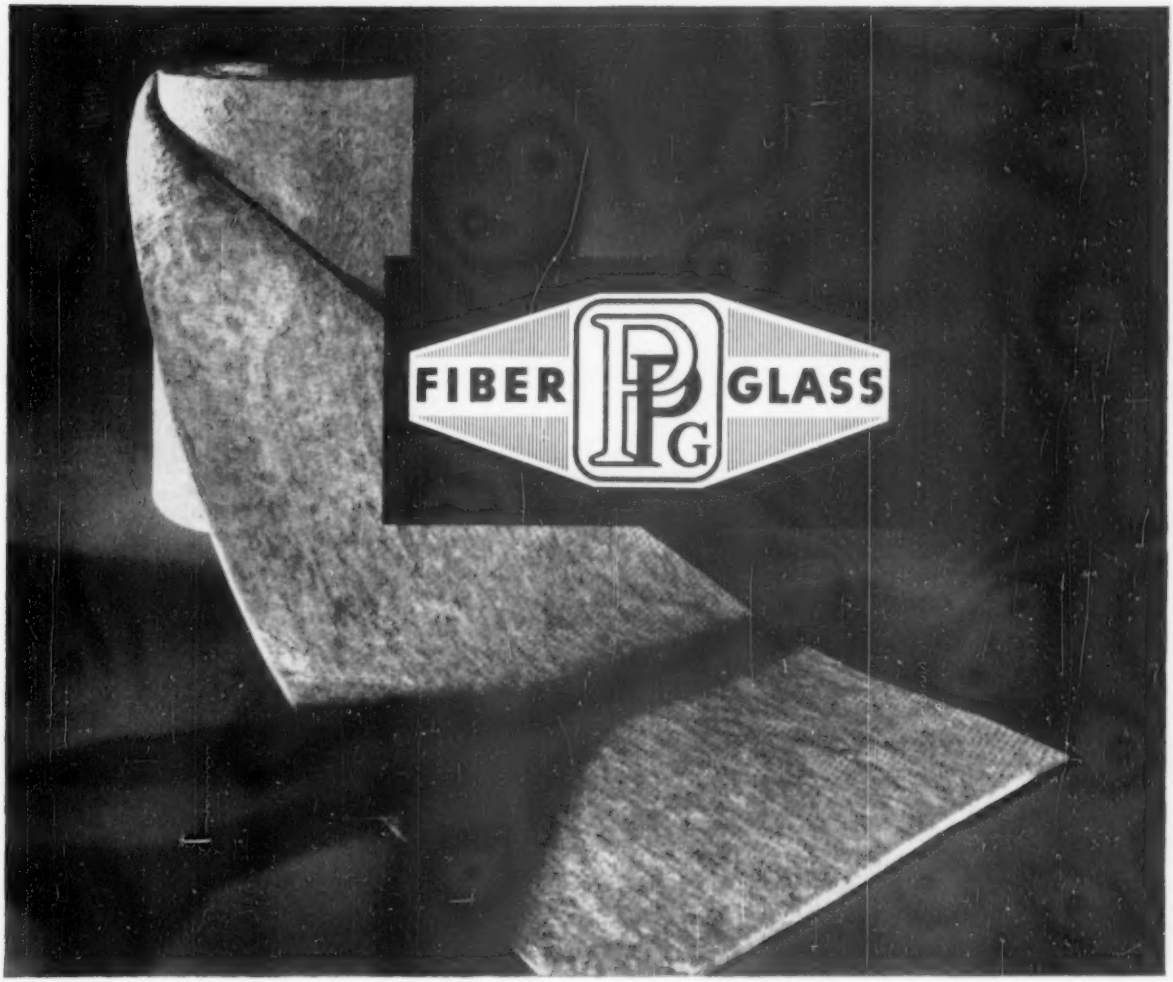
Now that North American has made the second big announcement of its developments in the field of atomic energy (AVIATION WEEK June 1, p. 17), the question of atomic power for aircraft has been dragged in again.

"Dutch" Kindelberger, NAA's chairman, made some pretty flat statements about the impracticability of such a powerplant. He used words like "very slow speed," "completely uneconomical" and wondered what it would prove even if you did build one.

According to a North American background release, there is another side to the story. NAA got into the atomic power picture in 1946 by investigating the possibilities of such an engine for a guided missile. "After careful study, the atomic research group concluded that nuclear reactor development had not reached the stage where application to guided missile work would be feasible. . . . Essentially the same conclusion was reached concerning atomic propulsion for aircraft. . . . A great amount of fundamental development with nuclear reactors, atomic fuels and fuel assemblies must be done before a practical atomic aircraft engine could be designed."

These conclusions were reached before 1948, before NAA became a contractor to the Atomic Energy Commission. At that time, getting any kind of information out of the AEC on atomic energy was tough, even with specific clearances. NAA probably had to work with incomplete data, and the scientists reached the only conclusions possible under the circumstances.

These conclusions are considerably different in implication from saying that nuclear engines just aren't practical; they say instead that much work has to be done before they will be.—DAA



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Special facilities have been arranged for serving the requirements of the aircraft industry. We will welcome the opportunity of giving you complete information. Pittsburgh Plate Glass Company, Fiber Glass Division, 420 Fort Duquesne Boulevard, Pittsburgh 22, Pa. District Sales Offices: Chicago, Cincinnati, Cleveland, Detroit, New York, Washington.

"AA" and "B" Grades Available

Both the special aircraft grade "AA"—and the "B" fiber, which is also used extensively in many aircraft insulation applications, are available in a complete range of blanket roll widths and thicknesses. Blanks cut to specifications are also available.

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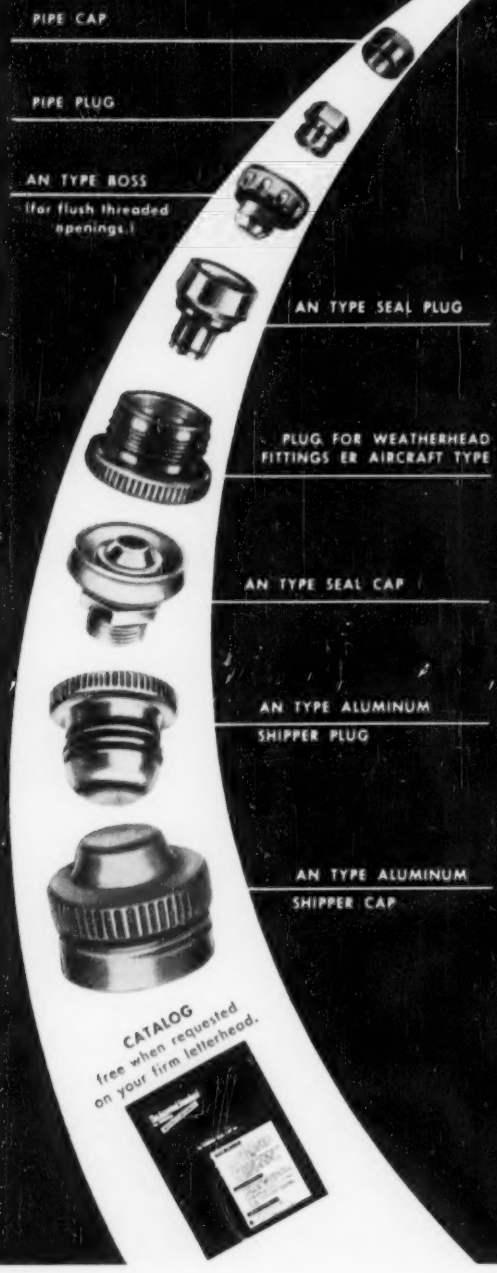
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LETTERS

No Engineer Shortage?

Your latest article on the subject of the current shortage of engineers (Thrust and Drag, May 4) brings up a question that has not appeared in any of the articles in AVIATION WEEK or in other publications.

The question is: Does an actual shortage of engineers exist or is it only a shortage of engineers who are willing to work for the salaries currently being offered by industry?

I am inclined to believe that it is the latter. I am informed by a reliable source that one of our Midwest aircraft manufacturers actually pays his mechanics more than he does his engineers. The same source reports that this same manufacturer, while engaged in recruiting engineers on the West Coast, had the embarrassing experience of having his "recruiters" pirated by West Coast industry.

It is altogether true that the salaries being offered recent engineering graduates with no experience are very attractive but it has been my personal observation over the period of the last six or seven years that there is considerable reluctance on the part of industry to offer equally attractive salaries to experienced engineers.

I believe it would be well, before "using the barrel itself" as you suggest, for industry to review the entire subject of salary versus experience as well as the subject of where the engineer fits into the over-all salary picture of industry.

FRANK H. HIGHLEY
5226 Overlook Drive, Lake Cable
Canton 9, Ohio

Praise

Referring to Katherine Johnsen's column in the Apr. 6 issue of AVIATION WEEK, the subsidy comparisons were very interesting.

How does the subsidy paid the airlines compare with the revenue that accrued to the Post Office from airmail in 1952?

Your editorials leave nothing to be desired. Keep up the good work.

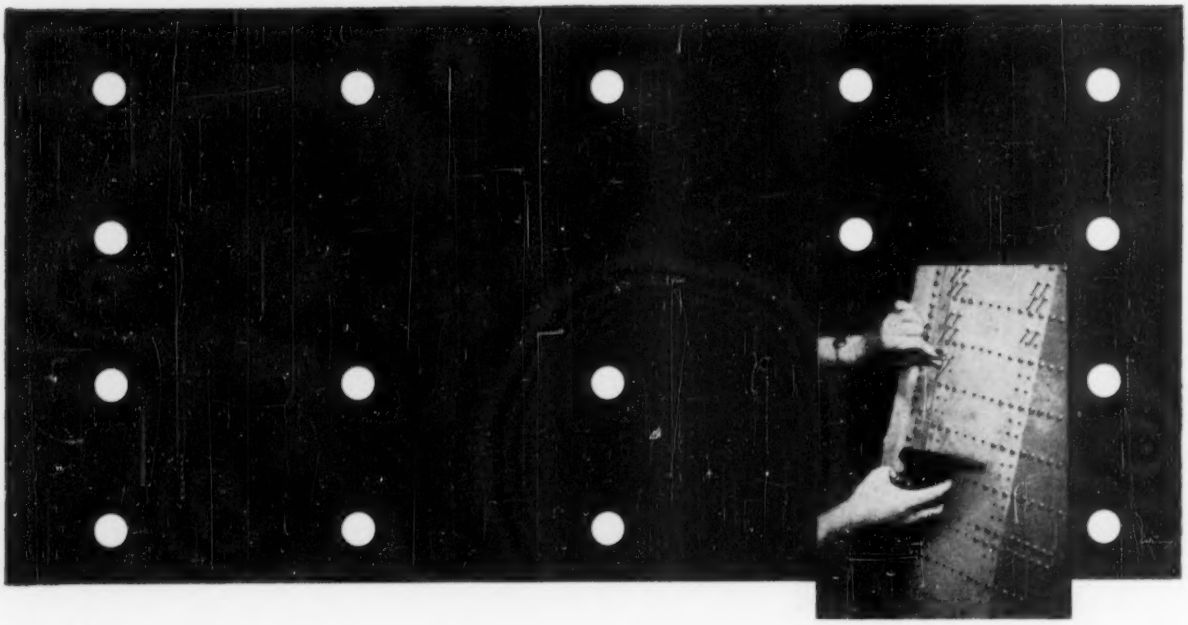
R. F. LYBECK, Sales Dept.
Esso Standard Oil Co.
135 Clarendon St.
Boston 17, Mass.

I have just read with interest your fine editorial (The Awakening to Safety) in the Mar. 23 AVIATION WEEK. The recognition and support that you have given to the Flight Safety Foundation has been of great value and is much appreciated.

HARPER WOODWARD
30 Rockefeller Plaza
New York 20, N. Y.

With pleasure, I read the fine article on our firm in a recent issue. I wish to extend my thanks to you for this well-written piece. . . .

FRANK L. DAVIS, President
Davis Aircraft Products, Inc.
1191-5 Spofford Ave.
New York 59, N. Y.

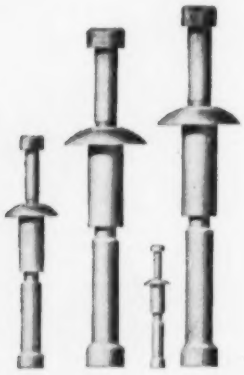


"A plane is a collection of aluminum holes held together by rivets," an aircraft designer once said jokingly in emphasizing the importance of rivets to aircraft construction. The majority are solid rivets which are driven and bucked by conventional methods. But a vital minority are actually precision parts, such as Cherry Blind Rivets, of which as many as 250,000 are used in one super-bomber—60,000 in a smaller fighter or transport.

These ingenious fasteners are set quickly and easily by one man from one side of the work with a special tool that pulls the rivet tightly into place without bucking, hammering or exploding. Blind rivets are virtually indispensable to modern plane construction as their use makes possible riveting in difficult-to-reach places, thus permitting freedom of design not possible with other types of fasteners. This feature also enables manufacturers to cut unit costs and speed production.

Townsend's Cherry Rivet Division at Santa Ana, California, is dedicated to the production and perfection of this single product. Here, highly trained personnel using Townsend designed and built equipment devote their entire attention to the manufacture of these precision rivets which are matched and tested against an elaborate set of specifications in order to give the excellent performance required. The greatest portion of Cherry Rivet production goes into military aircraft and will continue to do so as long as the nation's aircraft needs remain critical.

Cherry Blind Rivets are only one of some 10,000 different types, sizes and kinds of Townsend fastening devices produced at its several plants. With all these items at their command, Townsend engineers are able to give you unbiased advice—help select or design the fastener best suited for your product or assembly methods. A folder describing Townsend fasteners which are used to increase efficiency and improve products is yours for the asking.



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THE FASTENING AUTHORITY—Experience: *over 137 years*—**Capacity:** *sixty-million parts daily*—**Products:** *over ten-thousand types of solid rivets—cold-headed parts—Cherry Blind Rivets—Twinfast Screws—self-tapping screws—tubular rivets—locknuts—special nails—formed wire parts.*
Plants: *New Brighton, Pennsylvania—Chicago, Illinois—Plymouth, Michigan—Santa Ana, California.*

FLOOR SECTIONS are aluminum sandwiches faced with paper-base phenolic laminate.

WALLS of forward cargo compartment use Conolon skin over aluminum honeycomb.

SHIELD of Conolon laminate protects fuselage from ice thrown by propeller.

Many Plastics Go in Convair 340

A wide assortment of plastic materials is being put to work in aircraft applications where light weight and durability are key factors.

Although most recent news of plastics has concerned the trend toward high-temperature, high-strength structural uses, a report from Consolidated Vultee Aircraft Corp. shows how the materials already have been established in many non-structural jobs.

Details of applications in the Convair-Liner 340 are revealed by Convair plastics engineer Harold H. Rosenbaum. He feels that if service reports over the next few years continue to be favorable, it is likely that new plane designs will incorporate greater quantities of the materials.

▶ **Big Use in Convair-Liner**—Even now, each 340 transport incorporates about 1,000 pounds of plastic materials—about 3½% of the plane's 28,500-lb. empty weight.

Thermosetting materials in the 340 are practically all of the laminated variety. Fiberglas fabrics with polyester or modified phenolic resins make up the bulk of these materials. Cotton fabric-phenolic laminates are used in small quantities.

▶ **Sandwiches**—Partitions, doors, bulkheads and overhead hat racks are sandwich structures. Core for the hat rack panels is cellular cellulose acetate; for the other units, aluminum honeycomb. The sandwich skins are Fiberglas made with a modified phenolic resin known as Conolon (Narmco, Inc.). This covering was selected because of superior impact resistance, and for an equivalent weight Conolon skin can be made a third thicker than metal skin, Rosenbaum claims. This gives the skin greater dent resistance.

About 800 sq. ft. of these skins, weighing about 145 lb., is used in each plane.

This same type of laminate is used as a liner for the luggage compartment—about 32 sq. ft. of material weighing about 10 lb.

▶ **Duct System**—The plane's ducting system makes extensive use of the Conolon laminate, chosen here for its toughness and ability to be shaped to odd contours. Cross-sections of the ducts vary from round to rectangular—in several cases the change takes place in a single piece.

In many instances, the plastic ducts are cheaper to fabricate and lighter than the metal equivalent. The 340's plastic ducting totals about 150 lineal feet for a 28-lb. weight.

▶ **De-Icing Protector**—A shield of Conolon laminate, backed by a thin rubber sheet and attached to the fuselage in the propeller areas, protects the body metal skin against denting and puncture from ice thrown during de-icing. The laminating resin is pigmented with aluminum so that after the material is cured it matches the color of the fuselage.

The 340's flooring is an aluminum honeycomb core bonded to aluminum alloy sheet with the same modified phenolic adhesive used for bonding the Conolon skins to core material in doors, bulkheads and partitions.

Floor skins also are decked with a paper-base phenolic laminate known as Geneerco (General Veneer Co.). Luggage racks and radio equipment racks also use the metal sandwich makeup bonded with the modified phenolic resin.

▶ **Liners**—In the three cargo areas—forward, belly and aft compartments—a polyster resin-Fiberglas laminate is used for wall liners. These vary from .025 to

STILL IN SERVICE AFTER 17 YEARS!

This is a typical, rugged Adams-Rite lock returned to the factory for servicing. Originally installed on the lavatory door of a DC-3, the lock has withstood 17 years of hard passenger service. When it has been inspected and minor repairs made, it will again be in use.

Way back in 1936 the airframe companies first asked Adams-Rite to design and manufacture their requirements for locks and latches. Since then thousands have been built—for virtually every new airplane. Obviously, this accumulation of engineering and manufacturing experience, plus the stocking of assemblies and parts cannot be duplicated elsewhere.

When you need a lock or latch for a new application or for replacement—ask Adams-Rite. They are designed to fit your installations exactly, without modification—they are built to withstand vibration and customer abuse—and they are always available year after year.

Douglas DC-3, C-47, DC-4, C-54, DC-6, DC-6A, DC-6B
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Boeing Stratofreighter and Stratocruiser
Martin 202 and 404
Convair 240 and 340

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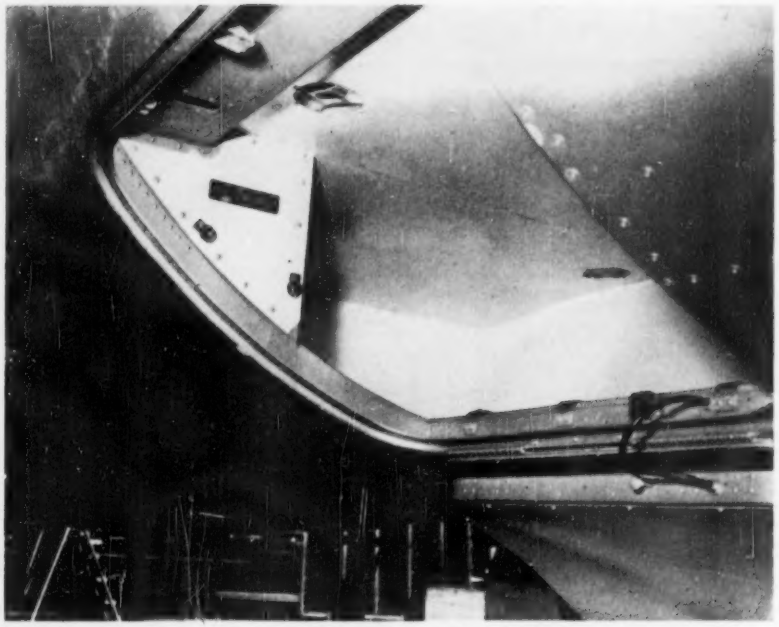


LINER on belly cargo area's top, sides is polyester resin-Fiberglas laminate over metal.

.032 in. thick. About 310 sq. ft. of this material is used, weighing 84½ lb.

Other polyester laminate parts are battery containers, wing trailing edge strips, power distribution box and an oil drip pan. Some antenna housings and masts are also polyester laminates. Total weight of parts is about 25 lb.

Laminated plastic liners serve to confine heated air (about 450F) for anti-icing in the wing leading edge. A special high-temperature-resistant phenolic resin (CTL-911D) is used for this laminate, which totals an area of about 100 sq. ft. and weighs 10 lb.

▶ **Cotton-Base Material Used**—Relatively small amounts of cotton-base post-formed phenolic laminates are used in the 340, Rosenbaum says. Major items are the air diffusers under the hat racks. Other post-formed laminate parts are radio rack covers, plenum pans and pilot's floor scuff plates. About 9½ lb. of this material is used.

Laminated phenolic control pulleys—about 105 per plane—total about 14 lb.

Laminated and molded plastics in radio and electrical equipment account for another 25 lb.

▶ **Thermoplastic Compounds**—Thermoplastic materials in the 340 include Royalite (U.S. Rubber Co.); Tenite II (Tennessee Eastman Corp.); Plexiglas II (Rohm & Haas Co.); vinyl fabrics such as Kalistron (Mengel Co.), Avtrim (B.F. Goodrich Co.) and Vinyon (uses a Carbide & Carbon Chemical Co. yarn); and polyvinyl chloride-acetate.

Royalite parts such as wainscotting and pilot's compartment overhead trim are made from flat sheet stock. Window frames, lavatory panels, stowage bins, instrument consoles, control pedestal covers and many other parts are made from formed and drawn Royalite. This material was selected, says Rosenbaum, because of its toughness, formability, color, patterned surface and low density. About 225 lb. of the Royalite is used in each ship.

AIR DUCT is made of reinforced-plastic. Blankets are faced with vinyl.

Tenite II is used in extruded form for curtain tracks, door and panel edgings, fabric retainer moldings and panel retainers. Characteristics are dimensional stability and matchability to almost any color. About 25 lb. is used.

Plexiglas II serves as an inner liner on windows to prevent moisture condensation on the glass surface. Material

New air taxi leapfrogs traffic at 98 mph

...with help of 22 TIMKEN® bearings

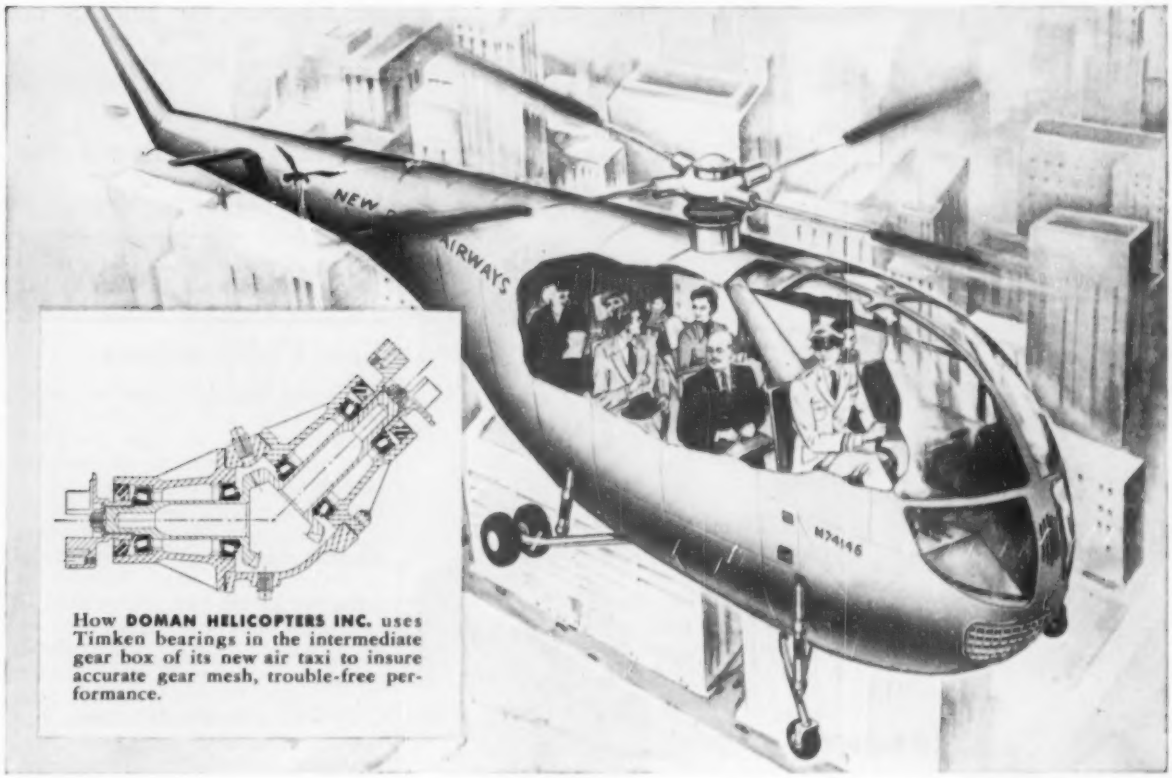
TRAFFIC'S no problem for this new air taxi, the Doman LZ-5 helicopter. Its rotor blades are powered by precision-built drive units equipped with 22 Timken® bearings to insure trouble-free performance, long life.

Line contact between the rollers and races of Timken precision bearings gives them extra load-carrying capacity. Their tapered construction takes radial and thrust loads in *any* combination. Shafts in the rotor drives and intermediate gear box are held in positive alignment, gears mesh accurately, wear on moving parts is reduced.

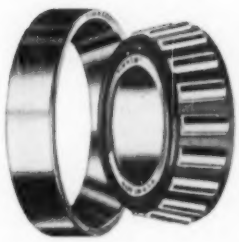
Friction is practically eliminated by the true rolling motion and incredibly smooth finish of Timken bearings. By holding shafts and housings concentric, they make closures more effective. Lubrication time and costs are greatly reduced.

No other bearing can give you all the advantages of Timken bearings. Look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best

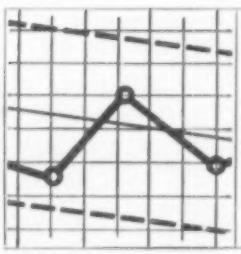


How **DOMAN HELICOPTERS INC.** uses Timken bearings in the intermediate gear box of its new air taxi to insure accurate gear mesh, trouble-free performance.



TIMKEN

TAPERED ROLLER BEARINGS



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snap-on latch for instant removal ...fast installation for removable equipment.

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even circumferential take-up ... security seal for all types of hose and duct connections.

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each clamp covers wide range of diameters.

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for extra wide joints with either Quick Coupler or T-Bolt latch.

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all stainless design for simplicity and lowest price.

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11214 EXPOSITION BLVD.
LOS ANGELES 64, CALIF.

is 0.1 in. thick; total weight used is about 16 lb.

▶ **Fabrics, Tubing**—The vinyl fabrics—used for upholstering on a large portion of the interior—total about 142 sq. yd. and weigh about 150 lb.

The polyvinyl chloride-acetate is used in extruded flexible tubing—mainly as conduits for bundles of wire. This material weighs about 10 lb.

Another 10 pounds of plastics (nylon, polyethelene and polystyrene) go for applications such as water lines, door seals, control handles, knobs and electrical equipment.

▶ **Problems**—Convair has learned that one difficulty in using plastic materials is matching of colors, says Rosenbaum. In some instances, it is necessary to paint surfaces.

Another problem in the early stages of use was the reduction in thickness of some drawn parts. This was corrected, Rosenbaum says, by increasing the starting thickness of the sheet and improving forming techniques.

Initially, difficulty was encountered in cementing vinyl sheeting to partitions—the cements caused the sheet to stain. This was remedied by backing the vinyl with a cotton jersey fabric and developing non-staining adhesives.—IS

WHAT'S NEW

New Publications

Magnetic-amplifier **regulated power supplies** (high and low voltage) with regulations down to .15% for laboratory testing applications are described in Bulletin L453 being distributed by Perkin Engineering Corp., 345 Kansas St., El Segundo, Calif. . . . **Molykote lubricants** for industrial use are detailed in Bulletin 100, which includes information on two new grades: Type U, a grease-consistency mixture for extreme bearing pressure lubrication at —40F to 400F, and Molykote-Silicone 77, a grease-consistency mixture processed with a high-grade silicone fluid and stabilizer. Write Alpha Corp., Greenwich, Conn. . . . **Production, angle, drill press,** swivel machine, hand and other vises, rotary tables, milling attachments, adjustable angle plates and other machine tool accessories are detailed in a new catalog available from Chicago Tool & Engineering Co., 8383 S. Chicago Ave., Chicago 17, Ill.

Nine-inch precision lathes made by South Bend Lathe Works are illustrated and full technical descriptions given in Catalog 5304 being distributed by the firm. Address 425 E. Madison St., South Bend 22, Ind. . . . **Piston-type motors** in 32 standard sizes up to

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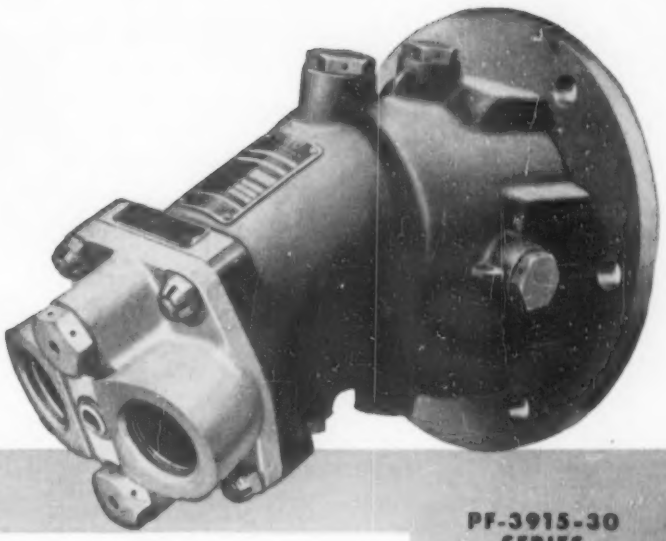

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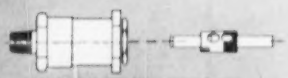

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57.8 hp. are covered in Brochure A-5205 published by Vickers, Inc., Detroit 32, Mich. . . . **Divided circle spectrometers** and accessories for industrial and educational applications are described in Bulletin 157-52 available from Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago, Ill. . . . **Marking devices,** including coining and embossing dies, highspeed profiling, machine engraving, stencils, symbol stamps and other equipment are detailed in Catalog 53 available from Newark Stamp & Die Works, Inc., 203-205 Market St., Newark, N. J. . . . **Miniaturized, hysteresis-synchronous control** and damped-control instrument motors for military and civil applications are covered in new catalog being distributed by Servomechanisms, Inc., Post & Stewart Ave., Westbury, N. Y.

Aircraft hardware catalog, first in a series of seven, illustrates and details all items distributed nationally by Air Associates, Inc., and provides simplified ordering information and weight tables. Included are 184 reprints of original AN specs with part dimensions for items given. Write the firm, Dept. AD, Teterboro, N. J., and ask for AA Catalog 21A. . . . **Electric immersion heaters** of two types—a heavy-duty steel-sheathed unit for heating noncorrosive liquids and mixtures, and an acid tank heater with a non-corrosive fused quartz body—are described in catalog published by Cleveland Process Co., 7016 Euclid Ave., Cleveland 3.

Recirculating heat-treating furnaces for metal working are described and performance records given in Bulletin 81 put out by Despatch Oven Co., 619 S. E. 8th St., Minneapolis, Minn. . . . **Dynamometer Model L and low-range testers** and accessories are described in Bulletins 2, LR-2 and D-4 being distributed by W. C. Dillon Co., Inc., P.O. Box 3008, 14620 Keswick St., Van Nuys, Calif.

Self-aligning spherical roller bearings are covered in Bulletin 200-C which includes engineering information such as life expectancy, capacity ratings, installation and service factors, speed data, loads, fits and lubrication. A width tolerance chart and other references are also provided. Write Torrington Co., Bantam Bearings Div., South Bend, Ind. . . . **All-metal mounting systems** for isolating vibration and shock from electronic equipment by use of Met-L-Flex damping elements are detailed in Vizualizer Bulletin 750 available from Robinson Aviation, Inc., Teterboro, N. J. . . . **Penacolite Resorcinol adhesives** meeting government military specs and applicable to aircraft use are detailed in Bulletin C-3-149

ANNOUNCING

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Latest product of creative Ryan aircraft engineering and manufacturing is the FIREBEE, the newest high-speed, high-altitude jet-powered aerial target plane. The FIREBEE is remote controlled and recoverable by parachute.

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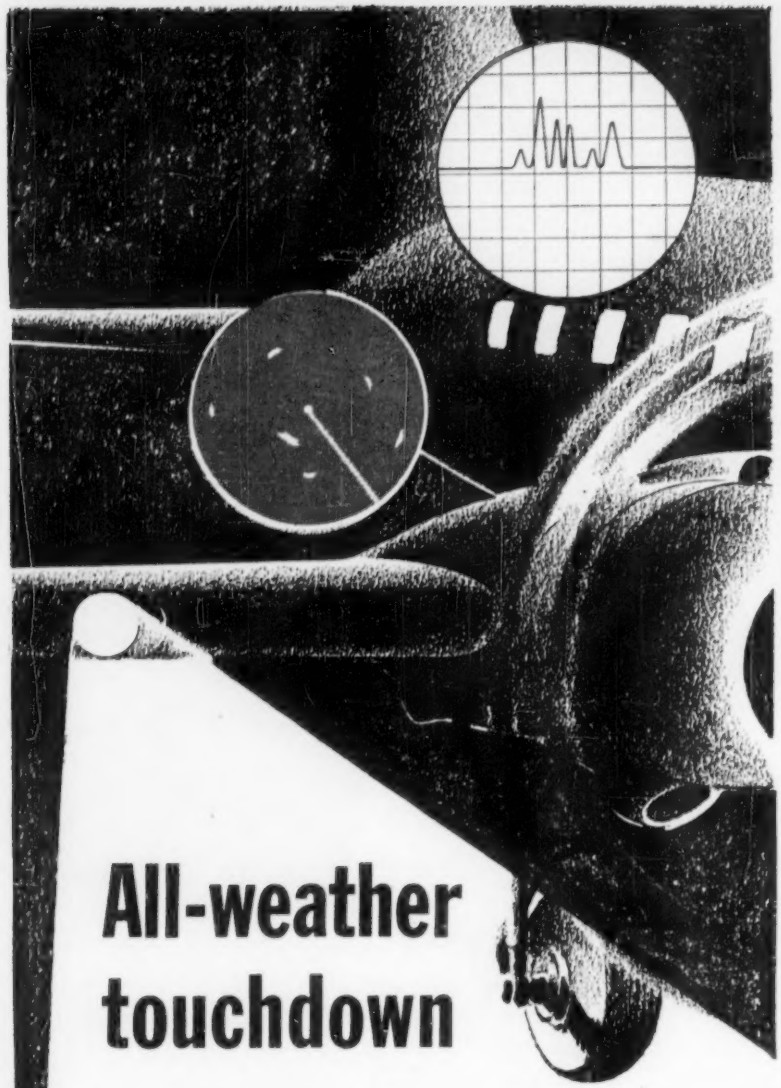

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obtainable from Chemical Div., Koppers Co., Inc., Koppers Bldg., Pittsburgh 19, Pa. . . . **Fixture clamps** and details are covered in illustrated looseleaf catalog being distributed by Morton Machine Works, 2421 Wolcott St., Ferndale 20, Mich., Dept. 26.

Silicone rubber for wire and cable insulating is described in Bulletin CDS-13, which includes information on silicone processing. Write General Electric Co., Chemical Div., Pittsfield, Mass. . . . **Free-vane electronic pyrometer controllers** for low-open, high-open, low-high, low-open-high and low-normal-high control are detailed in Bulletin P1248 available from Bristol Co., Waterbury 20, Conn. . . . **Silicone and molded rubber** developments get thorough coverage in 52-page illustrated brochure which also contains ASTM, AMS, SAE and Mil-R-3065 rubber spec tables. Write Pacific Moulded Products Co., 905 E. 59th St., Los Angeles 1, Calif.

New Addresses

National Science Foundation has moved to 1520 H Street, N. W., Washington 25, D. C. New phone number is Sterling 3-2140; government telephone code is 1224.

Chapman, Bryson, Walsh & O'Connell has moved its Washington law offices to 1001 Connecticut Ave. Phone is Executive 3-3804.

American Aircraft Corp. has moved its activities on Teterboro Airport, N. J., to the Meteor hangar on the field. Phones are Hasbrouck Heights 8-0279 and 8-1482.

Bendix Computer Div. of Bendix Aviation Corp. has moved to 5630 Arbor Vitae St., Los Angeles 45, Calif.

Abrasive, Grinding Machine and Refractories Divs. of Norton Co., Worcester, Mass., have moved their New York offices to Green and North St., Teterboro, N. J. The office of Norton Behr-Manning Overseas, Inc., remains at 61 Broadway, New York 6.

Publications Received

• **Wings For Peace,** by Brig. Gen. Bonner Fellers (U. S. Army, Ret.), pub. by Henry Regnery Co., 20 W. Jackson Blvd., Chicago 4, Ill., $3.50. Gen. Fellers offers a defense program for the nation.

• **Accounting Guide For Defense Contracts,** by Paul M. Trueger, pub. by Commerce Clearing House, Inc., 214 N. Michigan Ave., Chicago 1, Ill., $7.50. A detailed study of government contracts and the accounting problems the defense orders involve.

Important savings at Eureka-Williams Corp. because

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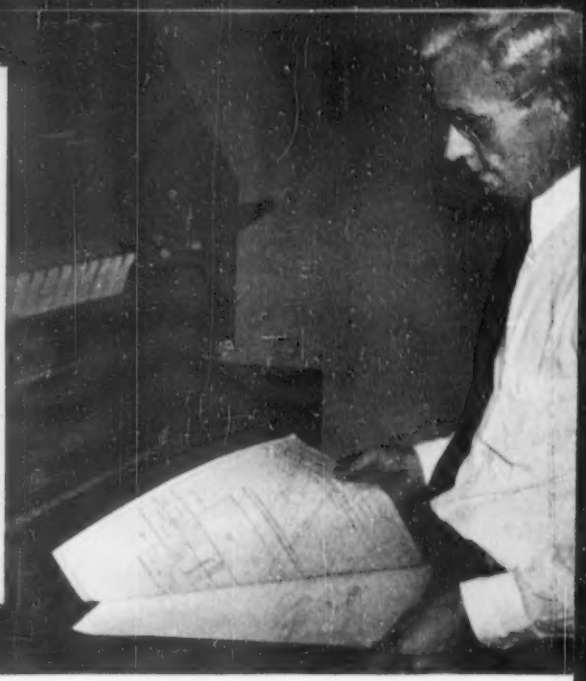

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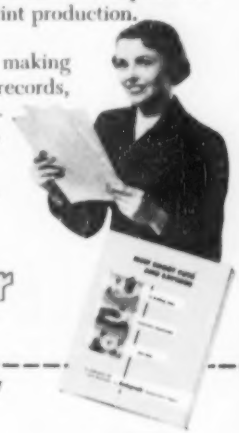

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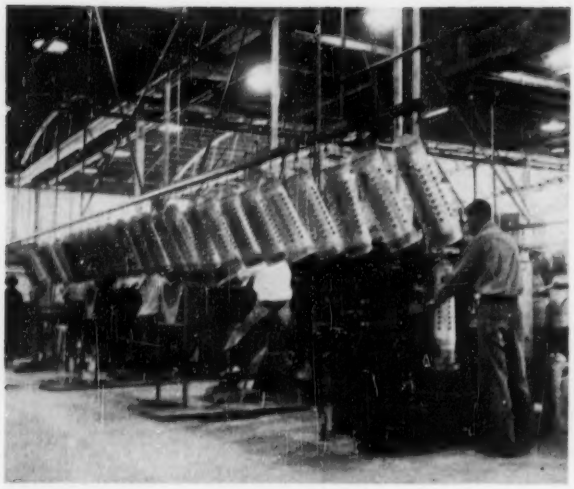
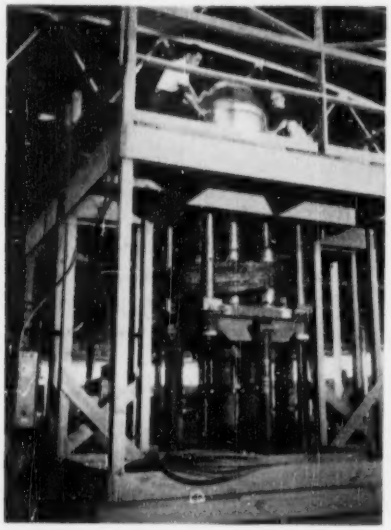


OVERHEAD CONVEYORS now speed progress of combustion chambers through Ryan's San Diego plant and eliminate clutter. Picture at right shows old way, with floor conveyor for moving parts.



EXPANDING MANDRELS form aluminum-alloy sections of large external wing tanks. New 4,800-tonner (left) is temporarily installed above floor; it will be sunk in pit later.

Streamlining Speeds Parts Production

Strict economies in manpower, factory space and processing time are key considerations in the manufacture of today's aviation components. Improvement of any of these operating factors can spell big savings in production rates and costs.

Ryan Aeronautical Co., in a continuing drive for production economy, has introduced several new tools and techniques at its San Diego plant. Among them:

- **Overhead conveyor line** for jet engine components.
- **Heat-treat facility** to prepare aluminum alloy for forming.
- **Huge expanding mandrel** for forming circular-section components.
- **Tube fabricator** that forms odd shapes.

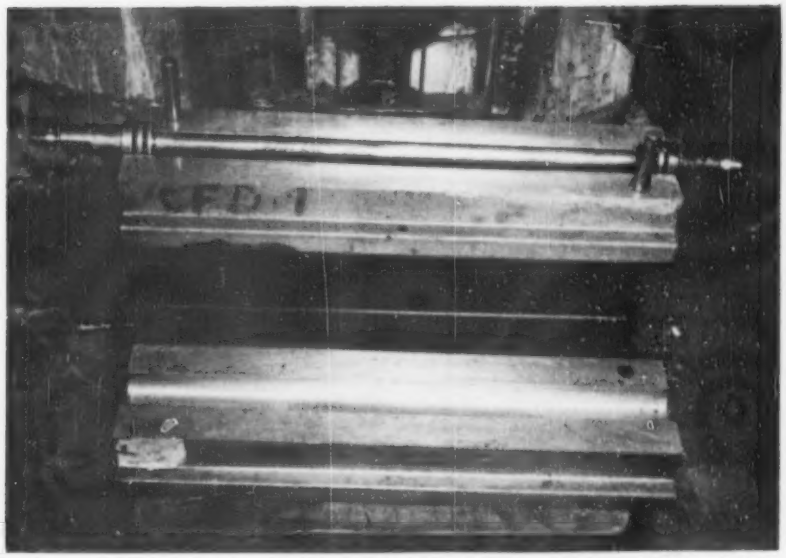
▶ **Overhead Conveyor**—The raised conveyor line is saving Ryan about two-thirds of the floor space formerly required for producing General Electric J47 combustion chambers and transition liners.

Another dividend is a two-thirds slash in time for routing parts between fabrication stations and for parts-handling. This adds up to 13% less manpower for the same production as before.

Combustion chambers and transition liners are made in adjacent areas by relatively similar methods. The formed sections are mated and spot-tacked in exact alignment, then permanently welded at the seams by resistance welding machines. Fittings and reinforcing members are welded on, the assemblies rounded and sized in expanding mandrels, then inspected, marked and boxed. This means a lot of parts handling and movement.

Before the raised conveyor was installed, combustion chambers were rolled from station to station in the standard tote box. The liners were transported on tables on top of tote boxes. These conveyances blocked substantial floor space and required manpower for the transportation job.

▶ **Smooth Flow**—The new production layout with the overhead conveyors shuttles the parts in a uniform, unbroken flow with easy access and leaves



VARYING CROSS-SECTIONS are given to fuel tank vent tube (left) in hydraulic die-and-shaft combination. Right photo shows shaft that tube is slipped on for forming resting in open die.

the floor free. Machines can be grouped more closely, too.

The conveyor arrangement incorporates a continuous chain rolling on universally coupled ball bearing assemblies spaced at 8-in. intervals. Parts are suspended on steel hooks dangling from the chains. The entire system hangs from the roof structure by steel supports. Electric motors that power the system also are overhead and are geared for required conveyor speed.

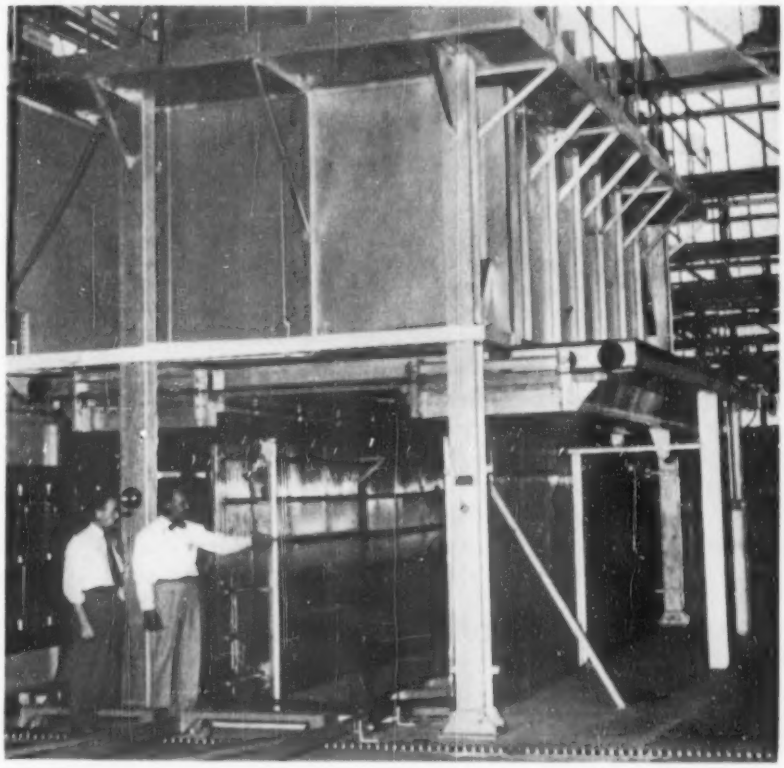
Because the jet components are small and weigh comparatively little, they can be lifted easily to and from the overhead system. Each part arrives in its proper sequence.

Parts quality has been improved too. Each component has its individual place —there is no close-proximity rubbing to cause scratches or other surface defects.

Ryan methods engineers Fred Sargent and Al Rider developed the new production layout. Miller Crane and Conveyor Co., Los Angeles, designed the installation.

▶ **Heat-Treat Scheme**—Ryan's new heat-treating facility for preparing aluminum alloy for forming is an electric furnace with a quick-quench feature allowing dousing of hot parts in cold water within a 6-sec. interval.

The heat-treat installation will be used to render the aluminum alloys ductile. The alloys have the property of hardening with age after heat treatment. Thus 24S regains 90% of its strength and hardness within 24 hours after heat treatment; within the following 72 hours it picks up nine-tenths of the remaining 10%. Ryan forms the alloys at once after heat treat or places them under refrigeration to retain ductility until they are to be formed.



HEAT-TREAT FURNACE has quick-quench pit directly below. Water-spray system helps reduce distortion.

For performing the heating and quick-quench, the new furnace installation is supported eight feet above the factory floor and over a 23x7-ft. pit 11 feet deep, containing the quench water.

The furnace compartment has continuous heating elements of nickel-chrome alloy for rapid performance. It is designed to maintain temperatures within ± 5F of specified settings. This is done by huge blowers which blast air through diverters to pick up the heat from the elements and distribute it uniformly through the furnace compartment.

▶ **Hot to Cold**—Parts are loaded into

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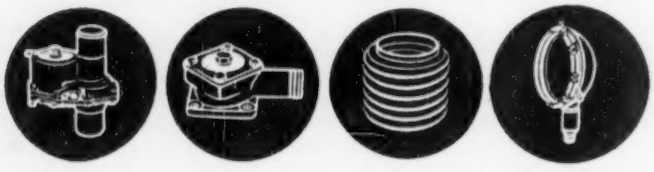

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the heating compartments by means of a pneumatic ram which hoists them vertically through the furnace bottom. The ram can be locked at floor level so that racks of metal may be rolled onto the hoist. Ram travel—more than 16 feet—takes the metal load from the furnace down to the quench tank below.

An automatic arresting action stops descent of the parts immediately prior to immersion. The parts are then gently lowered into the pool so that the soft aluminum will not be distorted by the impact.

Another feature aims to reduce distortion from uneven cooling. This is a water-spray system located between the furnace bottom and the quench pit. After the hot material is removed from the furnace, the ram is momentarily stopped at floor level for spray-quenching of the parts. Some distortion does occur in the subsequent immersion in the pit, because that part of the metal which first enters the dip cools before the remaining part.

Protective devices prevent the ram from being raised or lowered before the furnace doors are open; heating elements cannot be switched on before the blowers are operating.

The furnace was designed by James Knapp Co., Los Angeles.

▶ **Radial Forming**—Ryan is using an expand-forming technique to produce circular-section stainless steel and aluminum sheet metal components for aircraft and engines. The method employs huge expanding mandrels. Originally it was developed for the largest external

FLIGHT RECORDER

Complete log of an aircraft's flight, including radio conversations, airplane altitude, airspeed, vertical acceleration, and heading, can be obtained on this 18-lb. magnetic tape recorder developed by North American Aviation, Inc. NAA says the device, designed originally for use in guided missiles, is fire- and crash-proof and will record up to a 10-hour flight.

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—*with RCA Shoran*

A SHIP SANK in these remote straits—because a chart was wrong. But that won't fool navigators any more. Modern aerial survey . . . using RCA Shoran and photography together . . . recorded the *true* shoreline (the lines in white). Now, the charts are right!

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You, too, can help our Armed Forces keep our country safe. The U. S. Air Force urgently needs men and women volunteers to spot enemy aircraft—man Air Defense filter centers—do the many jobs as part of the Air Defense team. 200,000 patriotic Americans are serving. 300,000 more are needed.

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wing fuel tanks ever designed, but is now being applied to the manufacture of large components for turbojet engines.

In the fabrication of these components, Ryan rolls the sheet into truncated-cone or cylindrical shapes, then joins the edges on Heliarc welding machines. The sections are placed over the segmented shoes of the expanding mandrel and stretched to shape and dimension with precise control.

Ryan says this method is superior to conventional hammer-deformation or skin-forming techniques of producing large contoured surfaces. It does not produce the warpage (typical in hammer forming) which causes oil-canning, and avoids metal thinning, with resultant loss of strength, which sometimes occurs in spinning bell-shaped sections.

Expanding mandrels had been used at Ryan to size exhaust system tubes and to form beads and similar shapes in stainless steel ducting. These were small-size applications.

Extension of the method to the 3- to 4-ft.-diameter aluminum alloy external fuel tank, which involved 568 tons of mandrel force, proved successful. Not only were the straight-sided sections stretched to exact diameter, but elliptically curved sections were formed to contour with perfect results, Ryan says.

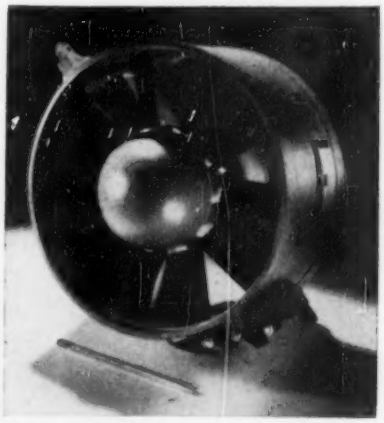
► **Size Increase**—This was followed by a 1,200-ton tool. Results on this equipment brought the decision to adapt the technique for large jet engine components made from heat-resistant stainless steel alloys.

To do the job, Ryan had Waldrip Engineering Co., Hollydale, Calif., build a new machine with a 4,800-ton push. Source of power for the mandrel is a huge hydraulic ram. Eight large, nickel-iron segments with aluminum alloy shoes exert the radial force to stretch the surrounding sheet metal jet component into shape.

Because precision was a primary requirement, Ryan designed the mandrel so that the actuating shaft causing the shoe expansion would have its movement limited by adjustable collars. One turn of the control wheels for the collars gives a change of .025 in. in the diameter of the mandrel. Fractional adjustments as small as .005 in. in diameter are easily attained.

The machine will handle both stainless steel and aluminum alloys. Aluminum skins can be formed in the SW condition or in the SO condition and heat treated later. Components are designed slightly smaller than required so that they can be stretched to the exact dimensions.

Ryan gives major credit for originating the new forming scheme to Richard E. Grabowsky, assistant superintendent of tool fabrication. The design job for the big-size mandrel was done by C. C.



EMERGENCY RAM TURBINE

AiResearch Manufacturing Co. has developed a new ram air turbine to supply emergency power for aircraft hydraulic systems in the event of main power system failure. The 12-in.-dia. turbine can be installed in an air duct or extended into the airstream. The unit reaches full power in one second at Mach 1 or three seconds at 130 knots. Speed is automatically controlled. Turbine weighs 15 lb. and occupies less than ¾ cu. ft. of space.

Facts *and figures!..*

Figure:

Is she putting the garter on — or is she taking it off? And why the wink? Your guess is as good as ours. There's no guesswork, however, about the charms of Betsy Perrine, 27, brown hair and brown eyes, who gives the scales a treat with 120 lbs. of olive-skinned loveliness.

Fact:

Something old and something new: Such a blend helps make a June bride the traditional symbol of beauty and joy. Such a blend, too, makes a Southwest Airmotive-converted executive airplane a beauty to behold and a joy forever to the pilot and owner lucky enough to possess it. This is a fact we have proved many times in giving a luxurious new touch to an old airplane. Write our Service Representative for more details.

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Aircraft Controls

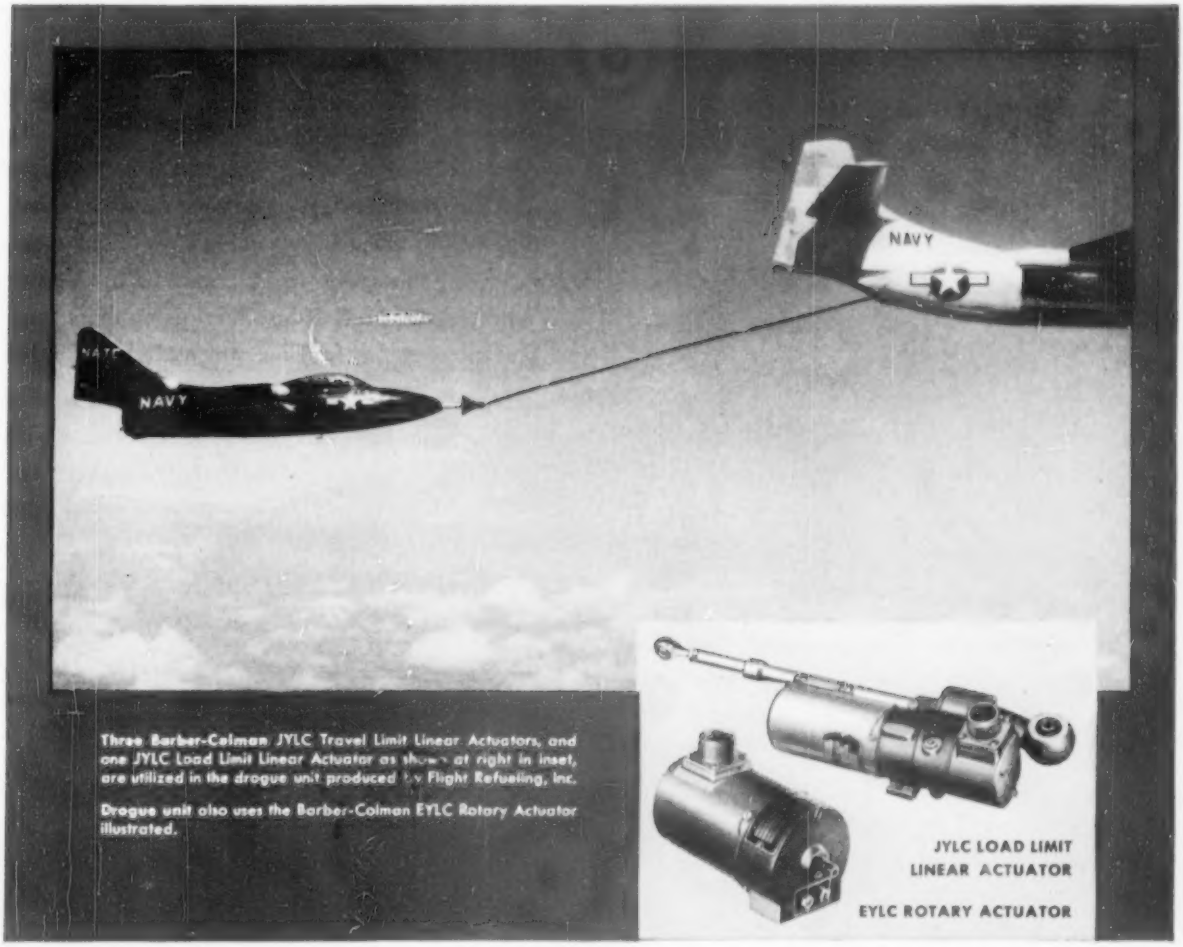
. . . reliable actuators control hose and reel of probe and drogue system during inflight refueling!

Mid-air refueling . . . with probe and drogue . . . marks another key step in the progress of aviation. Thirsty jet planes aloft are fed hundreds of gallons of fuel per minute with this system developed and manufactured by Flight Refueling, Inc.

This means greatly extended range . . . permits take-offs with light fuel loads . . . makes possible many other new flight developments.

It's a *precision* operation throughout. And in the tanker's drogue unit, five Barber-Colman Actuators are used to *accurately control* the extension and return of the drogue hose.

Here is just another example of how Barber-Colman engineers team up with others in the aviation industry to help bring about important new developments for our military and civilian aircraft.



Three Barber-Colman JYLC Travel Limit Linear Actuators, and one JYLC Load Limit Linear Actuator as shown at right in inset, are utilized in the drogue unit produced by Flight Refueling, Inc.

Drogue unit also uses the Barber-Colman EYLC Rotary Actuator illustrated.

Write for Bulletin F-4381-1 . . .

Gives facts and specifications on Barber-Colman Linear Actuators. Mail request to Dept. F, 1422 Rock Street, Rockford, Illinois.

The Barber-Colman line of aircraft controls includes: Actuators; Valves; Positioning Controls; Temperature Controls; Small Motors; Ultra-Sensitive Relays; Thermo-Sensitive Elements. Engineering sales offices in Los Angeles, Seattle, Chicago, Baltimore, New York, Montreal.

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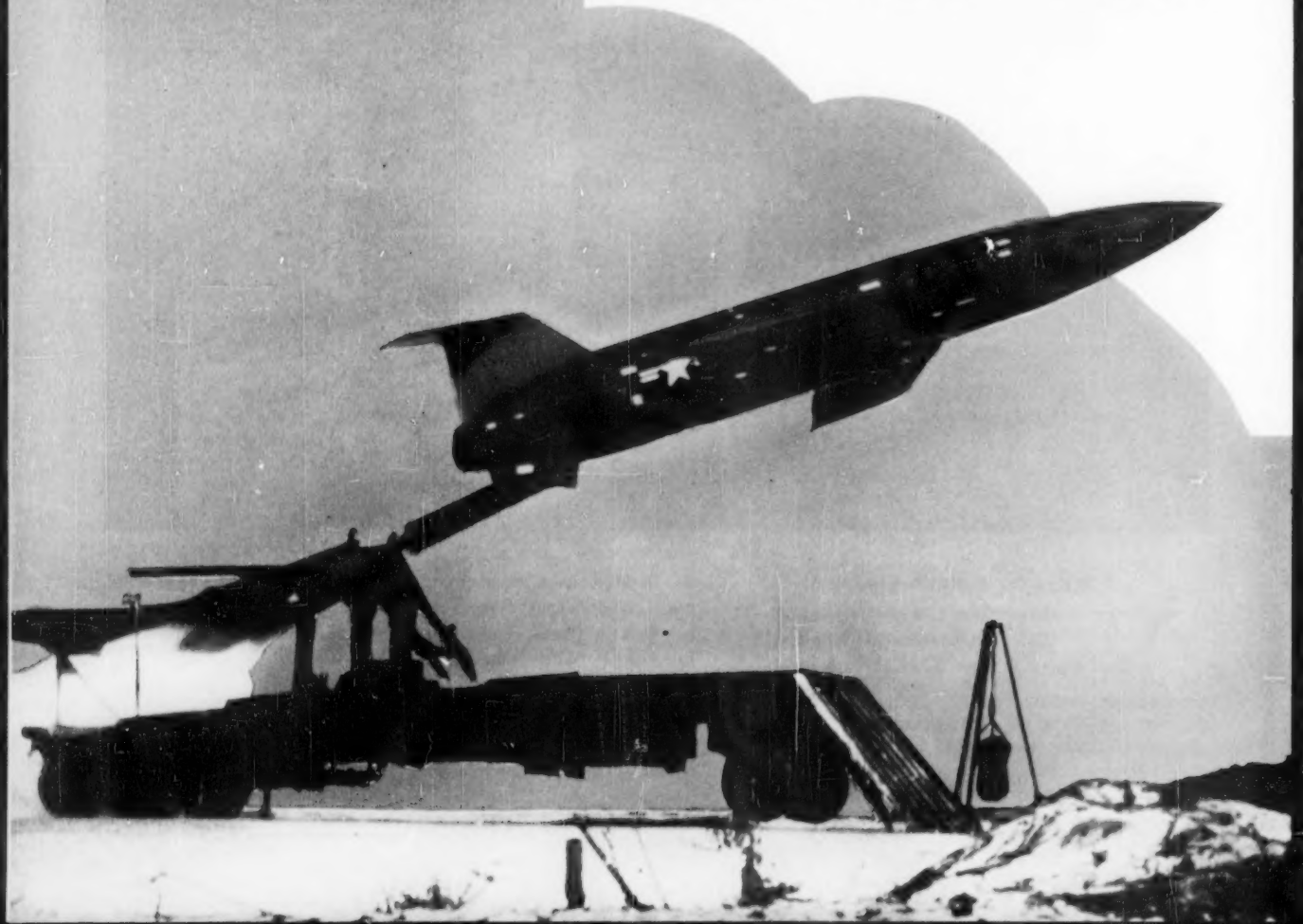
The Mission of the Air Research and Development Command is to make certain that the United States Air Force is now, and will continue to be, equipped with the *best planes, fuels, weapons,* and *techniques,* that modern science can devise. How this Command is serving the nation will be reported by AVIATION WEEK, August 17, 1953. There is no more important subject today for Government, Industry or Mili-



THE AIR FORCE'S
DEVELOPMENT COMMAND,
REPORT "AVIONICS IN THE AIR FORCE."

answer to present and future air power progress

tary than the story of ARDC. In this Command rests the responsibility for present and future Air Power progress.

Along with the ARDC issue will be a special report titled "Avionics in the Air Force". This rapidly increasing, great, new Aviation market is indissolubly bound into Air Force Research and Development. Current problems and new techniques in communications, navigation, and fire control for high speed bombers, interceptors, and missiles will make for articles of absorbing interest to AVIATION WEEK subscribers. Within the limits of national security, this full fledged, detailed report will unfold the picture of our progress and needs for future years.

The ARDC issue will entail the most extensive traveling program for AVIATION WEEK editors in our history. Special flights have already been made to the 9 Major Centers, where briefings and staff meetings were held by the Command for the AVIATION WEEK Editorial Group. Followup trips are now being made by AVIATION WEEK editors on special assignment, revisiting each Center.

For the information of advertisers, there will be no advance in advertising rates. You are urged to contact the Sales Manager, AVIATION WEEK, 330 West 42nd Street, New York 36, New York or write ARDC Issue Headquarters, Lord Baltimore Hotel, Baltimore, Maryland.

Look for the August 17th, AVIATION WEEK issue for its extra editorial bonus

FACTS ABOUT THE ARDC ISSUE:

1. Like the 1952 AVIATION WEEK Air Material Command edition, there will be special de luxe copies available for Air Force use.
2. Due to our experience with the AMC issue—a sellout shortly after issuance, several thousand extra copies will be ordered and earmarked for Service use.
3. Advertising reservations should be made without delay. Last year's AMC edition was the largest yet published in our industry. Interest in the ARDC issue at this time indicates an equal, if not larger issue.

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Hasty, while H. F. Wallen worked out plans for the big machine's tooling.

▶ **Tube Shaping**—An unusual technique for forming tubes has resulted in a higher-quality product coupled with savings in time and material.

Ryan uses .035-in.-gage 52S0 tubes to vent fumes from the external wing tanks it builds for the B-47. The tube is located in the main strut fairing on top of the tank. Because the inside fairing space is limited, the tube must be irregular in contour—sections vary from round to elliptical.

Initially, Ryan built these tubes from half stampings which were welded together. While this gave a satisfactory tube, the method did not lend itself to stepped-up volume production. Each installation required 140 in. of manual welding and the tubes were susceptible to failure by splitting during bending operations.

Ryan next tried blowing the tube directly into shape by means of die blocks and hydraulic pressure, but springback caused tube distortion. Study indicated that the job could be done with 2-in. seamless tubing by first expanding the tube diameter to the cross-sectional area required for the final elliptical shape, then forming the desired irregular-shaped sections in finisher dies.

▶ **Round to Elliptical**—Now, Ryan cuts the seamless 2-in. tubing to length, allowing one inch extra to compensate for shrinkage when the tube section is expanded in diameter. The tube is fitted with an arrangement which allows application of hydraulic pressure. This is done by inserting within the tube a steel shaft drilled for inlet and outlet passages and fitted with O-ring bodies at its ends. One O-ring body is removable and is threaded on after the shaft is inserted in the tube that is to be shaped.

The entire assembly is placed in a steel die designed to allow the central portion of the tube to expand to a 2¼-in. diameter. The ram of press is brought down to close the die and hold it during the tube expansion. Hydraulic fluid is pumped in through the shaft to the tube interior and the flow is immediately reversed. The die is opened, excess fluid is drained off and the expanded tube removed.

The elliptical forming of the expanded section is accomplished in a finisher die in the drop hammer. To prevent the tube from wrinkling, it is filled with melted paraffin and refrigerated until the paraffin has solidified for the drop hammer operation.

Ryan says the new technique has permitted volume production and has resulted in substantial savings. Including all tool costs, the method has given a net saving of more than $15,000 per thousand tubes formed.

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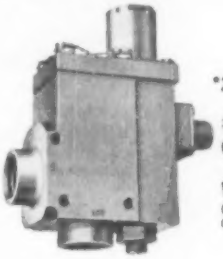

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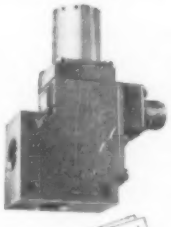

*26610 PILOT OPERATED. NORMALLY OPEN.
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Weight: 0.81 lb.
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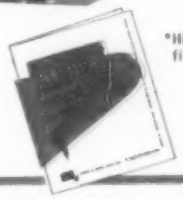
*High Flow Capacity Valve with filtered pilot circuit.



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SOLENOID DUTY: Continuous.
CURRENT DRAIN: 0.5 Amp at 24 VDC.
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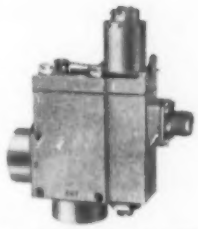

*25670 PILOT OPERATED. WITH MANUAL OVERRIDE. NORMALLY CLOSED.
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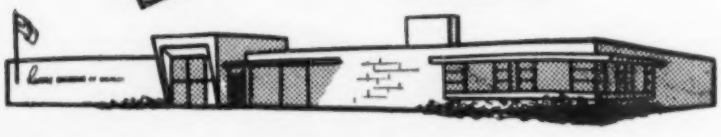

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PRODUCTION BRIEFING

▶ **Standard Pressed Steel Co.**, Jenkintown, Pa., is taking over Cooper Precision Products, Inc., Los Angeles, Calif., as a wholly owned subsidiary on July 1. The acquired firm makes hexhead bolts for the aircraft industry. Harry S. Cooper, president of CPP will retain his post under the new setup.

▶ **Garwin, Inc.**, Wichita, has been licensed by Sperry Gyroscope Co. to manufacture any new parts needed to modernize its directional gyros and gyro-horizons stocked by Garwin.

▶ **Grand Central Aircraft Co.**, Tucson, has delivered its last modernized Boeing B-29 Superfortress bomber to USAF. This marks the end of a three-year $30-million modification program by the firm. Contract covered 275 Superforts. Grand Central now is working on a Boeing B-47 Stratojet modification program.

▶ **Amelco** is new corporate name of American Electroneering Corp., now located at Santa Monica, Calif. Previously in Los Angeles, the firm is engaged in aircraft electronic and sheet metal production.

▶ **Calresin Corp.**, Arcadia, Calif., processor of compounded polyvinyl chloride hot melt materials, has purchased Poly-Fiber, Inc., Los Angeles, reinforced plastic molding and fabricating firm.

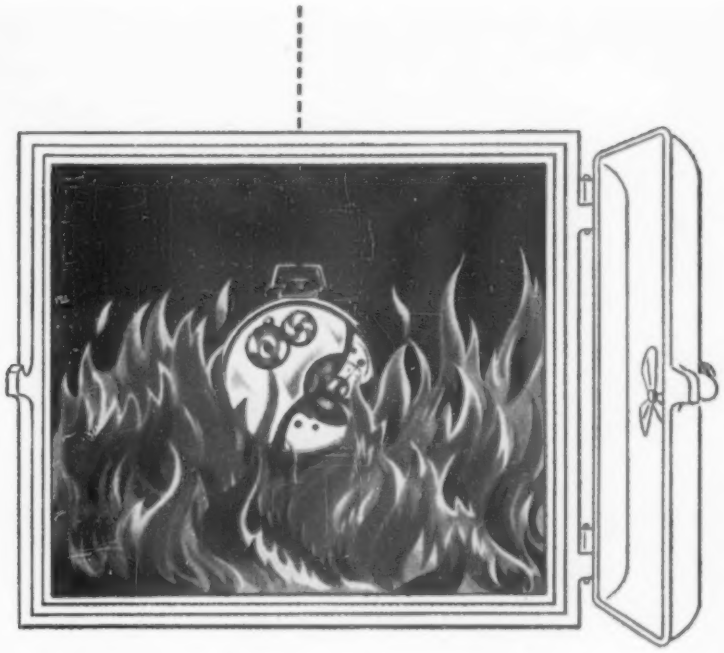
▶ **Industrial Crane & Hoist Corp.** is new firm name of Industrial Equipment Co., Chicago, maker of cranes, runways and hoists.

▶ **Lehman Brothers**, New York, has acquired an interest in Ketay Mfg. Co., New York, maker of precision synchros, resolvers, magnetic amplifiers, automatic controls and other electronic instruments. Frank J. Manheim, a Lehman partner, has been named to Ketay's board.

▶ **Sealtite Corp.**, St. Louis, has been appointed distributor for O-rings made by Parker Appliance Co., Cleveland.

▶ **Central States Engineering Corp.** and Ace Tool & Die Co., both of Detroit, have developed a joint service to design and build automatic production machinery. The service is being marketed under the firm name, Ace-Central States Machine Tool Co.

▶ **Babb Co., Inc.**, Newark, N. J., has purchased from Consolidated Vultee Aircraft Corp. the exclusive license rights to make and sell BT-13 trainer replacement parts.



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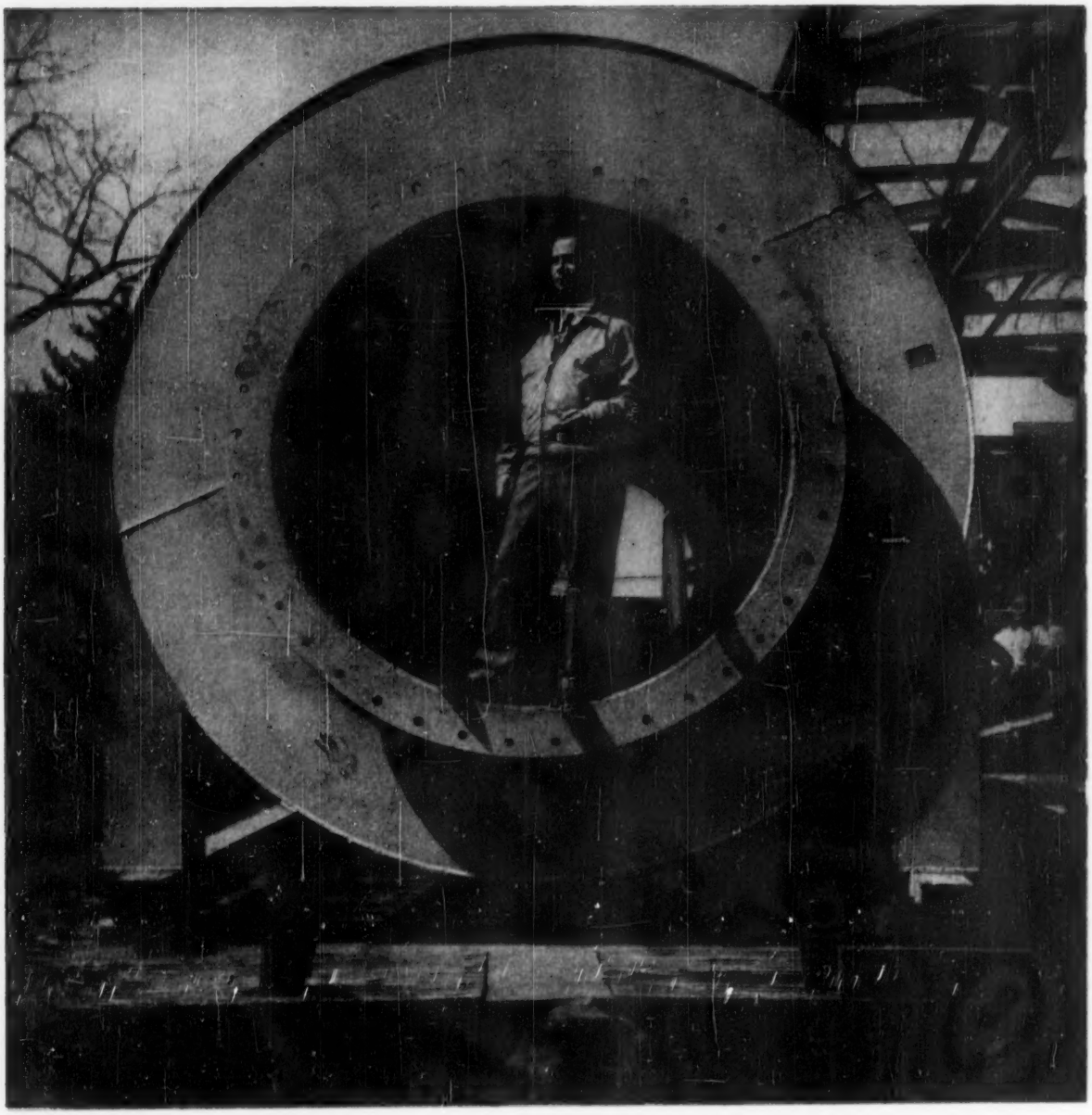

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AVIATION SAFETY

CAB Accident Investigation Report

Propwash Caused Bonanza Crash

A Lake Central Airlines Beech Bonanza crashed on final approach to Weir Cook Municipal Airport, Indianapolis, because of unexpectedly severe turbulence caused by an Eastern Air Lines Constellation that immediately preceded the smaller aircraft, Civil Aeronautics Board reports.

The Bonanza was demolished and its three of its occupants were seriously injured.

CAB says landing interval between the two planes was considered adequate by both the LCA pilot and airport controller but, because of violent backwash from the larger transport's propeller and wing tips, "was in fact insufficient."

The complete report:

THE ACCIDENT

At 1520[1] Aug. 21, 1952, a Beech Bonanza, N 8765A, owned by Lake Central Airlines and operated as Flight 4, crashed 332 feet short of Runway 31 at Weir Cook Municipal Airport, Indianapolis, Ind. During final approach for landing the Bonanza was thrown without prior warning into approximately a right vertical bank at an altitude of about 75 feet and sideslipped to the ground. The three occupants of the Bonanza were seriously injured and the aircraft was demolished.

HISTORY OF THE FLIGHT

Flight 4 departed Connersville, Ind., at 1451 on the last portion of a scheduled flight from Indianapolis to Cincinnati, Ohio, and return.

Upon departure of Flight 4 from Connersville the gross weight of the aircraft was approximately 2,344 lb. with two passengers, the pilot, 72 lb. of mail and baggage, and approximately 24 gal. of gasoline. The gross weight was less than the allowable certificated gross takeoff weight of 2,650 lb., and the load was properly distributed with relation to the center of gravity of the aircraft.

The flight proceeded without incident to the vicinity of Indianapolis on a VFR flight plan.

When about five miles southeast of the airport, the pilot of the Bonanza was given landing information for Runway 27 by the Indianapolis tower and was instructed to report over Stout Field, approximately 2½ miles east of Weir Cook Municipal Airport.

Shortly thereafter, the pilot reported passing Stout Field on a straight-in approach to Runway 27; the Indianapolis controller acknowledged the position and gave permission to continue the approach.

An Eastern Air Lines Constellation, operating as Flight 109, had approached the field from the northwest and made its downwind leg west of the airport. At the time the pilot of the Bonanza reported over Stout Field, the Constellation had been cleared to land on Runway 31 and its pilot and was making a left-hand approach. Shortly thereafter, the controller changed the landing instructions to the Bonanza and advised: "LAKE CENTRAL FOUR YOU'D BETTER SWING OVER. USE RUNWAY THREE ONE, FOLLOW THE CONSTELLATION."

The Bonanza immediately turned left to a southerly heading. The pilot made several S-turns in order to increase the time interval between himself and the landing Constellation, then made a wide right turn to align his aircraft for final approach to Runway 31.

The Bonanza began to turn to final approach as the Constellation landed.

The Bonanza, during final approach, was suddenly thrown into approximately a right vertical bank. This occurred at about 75 feet altitude and some 350 feet from the threshold of Runway 31. It struck first on the right wing tip, then described a partial cartwheel toward Runway 31 as the nose and then the left wing tip struck the ground. It came to rest on the nose (the engine was thrown clear upon impact), upright but tail high, on a magnetic heading of approximately 120 degrees and 140 feet beyond the point of initial contact with the ground.

THE INVESTIGATION

Indianapolis weather conditions at the time of the accident were: Broken stratocumulus clouds at 1,800 and 6,000 feet, with an overcast of alto-cumulus clouds at 10,000 feet; visibility 12 miles; surface wind from the west at 11 miles per hour. The wind was steady, with no gusts reported. Investigation revealed that there was little or no turbulence from natural causes.

Examination of the wreckage indicated no structural failure or malfunction of any component of the aircraft. This was further confirmed by the pilot of the Bonanza, who stated that no malfunctions were experienced.

A review of the maintenance records for N 8765A showed that all corrective maintenance had been accomplished, all applicable airworthiness directives complied with, and progressive maintenance checks made as required.

Capt. J. C. Thompson made the approach and landing of Eastern Air Lines Flight 109 at Indianapolis, a scheduled stop on the flight between Chicago, Illinois, and Miami, Fla.

He stated that both the approach and landing were normal and were made in accordance with Eastern Air Lines procedures. Manifold pressure was reduced to

[1] All times referred to herein are Central Standard and based on the 24-hour clock.

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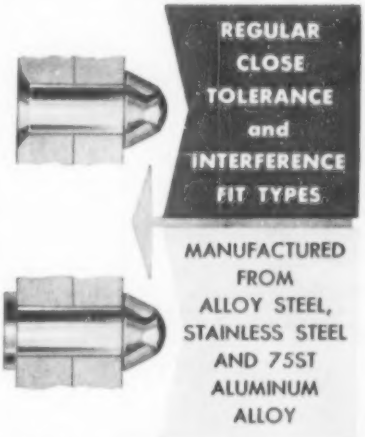
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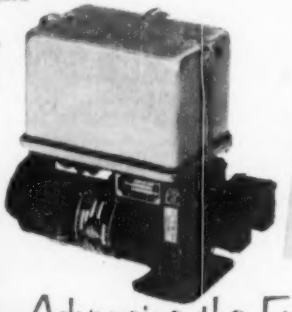

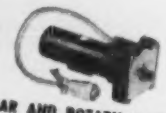

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20 inches prior to starting a left turn to base leg and final approach. During the descent, the power settings were increased to 22-25 inches and 2400 rpm. maintained. Flaps were extended to the 60% position when downwind, 80% at 700-800 feet altitude, and 100% flaps at 300-400 feet altitude when one-fourth mile from the end of the runway. Speed was reduced from 175 miles per hour on the downwind leg to 150 miles per hour on base leg, and 120-125 miles per hour was maintained during final approach to Runway 31.

Capt. Thompson sighted the Bonanza an estimated five miles to the northeast when the Constellation was turning base. He experienced no gusts or turbulence. After landing, the aircraft made a right turn at the intersection of Runways 9 and 31. Although the Constellation was equipped with propeller reversing, it was not used.

After the turn off was made and the Constellation was at a right angle to the active runway, Capt. Thompson glanced across the cockpit and saw the Bonanza in a right vertical bank a short distance from the approach end of Runway 31 at an estimated 25-50 feet above the ground. The nose was about level with the horizon and the landing gear was extended. He did not see the light aircraft thrown into the vertical position but observed it only during the sideslip and crash. The first officer of the Constellation was changing radio frequencies and did not see the Bonanza fall, but observed it only at impact.

Mr. Robert W. DeWitt, stationed at the local control position in the Indianapolis tower, testified that at the time the pilot of the Bonanza was advised to land on Runway 31 rather than Runway 27, the Constellation had completed its turn to final approach for Runway 31. It appeared to him that as the Eastern Air Lines aircraft approached the end of the runway, the Bonanza turned right for final approach. Immediately after the Constellation had turned off Runway 31, he observed the Bonanza in a normal approach an estimated one-half mile southeast of the airport.

After glancing at the Constellation to make positive that it was clear of Runway 31, he cleared the Bonanza to land.[2] He then momentarily directed his attention to the approach area of Runway 27 to make positive that it was clear of other traffic and therefore did not see the accident. He said that the Lake Central pilot "made a perfectly normal flight pattern" and that he had seen similar approaches completed without incident.[3] Mr. DeWitt testified that he would have transmitted precautionary advice to the pilot of the Bonanza had

[2] Section 3.141 of the joint Air Force-Navy-CAA publication, "Procedures for the Control of Air Traffic," states that "sufficient separation shall be effected between arriving aircraft to insure that the succeeding landing aircraft on the same runway will not cross the airport boundary in its final glide until the preceding aircraft has cleared the runway-in-use."

[3] Mr. DeWitt had been employed by the CAA as an Airways Operations Specialist at the Indianapolis tower since 1949, and was a certificated controller with an all-region senior rating; in addition he was a currently certificated commercial pilot.

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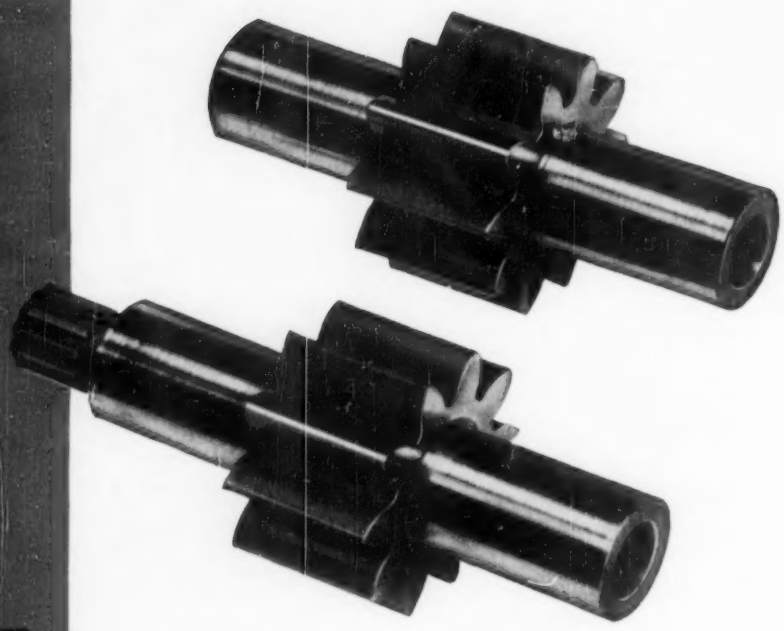

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he felt that a dangerous situation existed.

Capt. Haas said that as he passed Stout Field at 500 feet altitude, he lowered the landing gear and about one-third flap. At about the time he reported passing Stout Field, he heard the pilot of the Constellation report that he was about a mile south of Weir Cook Municipal Airport. The controller then requested Capt. Haas to land after the Constellation. He therefore maintained his altitude, turned left to a southerly heading when at an estimated 1,500 feet from the east side of the airport, and had the Constellation continually in sight from that time. The Constellation was proceeding downwind when first sighted, some two or three miles from the airport.

After the Constellation had turned off Runway 31, Capt. Haas began descent to final approach. He stated that since he still had considerable altitude, more flap (amount not recalled) was added, and the propeller was put in low pitch. The wings of the Bonanza were level in the final approach, with an estimated power setting of 14-15 inches of manifold pressure being maintained. The air was smooth until a single "terrific jolt" of turbulence, as he termed it, was experienced.

According to Capt. Haas, the nose was probably slightly elevated at the time he encountered the turbulence, for he had begun to reduce airspeed from 80 miles per hour in anticipation of the landing flareout. However, the airspeed was nearly 80 miles per hour at that moment and far from the stalling speed of 55 miles per hour. He felt no indication of a stall. Full power and counter control—full left aileron and rudder, wheel forward—had no effect until the Bonanza started to recover at 5 to 10 feet above the ground.

All three occupants had their safety belts fastened; the rear belt broke in the webbing, but the other two did not fail.

Capt. Haas estimated that the closest horizontal separation between the two aircraft while the Bonanza was in final approach was about 3,000-4,000 feet. He stated that separation with the Constellation was that which he would normally maintain in any approach.

He also testified that he had previously experienced turbulence in this and other aircraft during approaches for landing, but had always been able to maintain control. Capt. Haas could not recall having experienced turbulence in the wake of a Constellation prior to this incident. The possibility of such turbulence occurred to him during the approach, he said, but no difficulty was anticipated since the distance and time separation seemed adequate. He felt that additional altitude would have enabled him to recover, but that "quite a lot of air speed" would have been necessary to effect recovery.

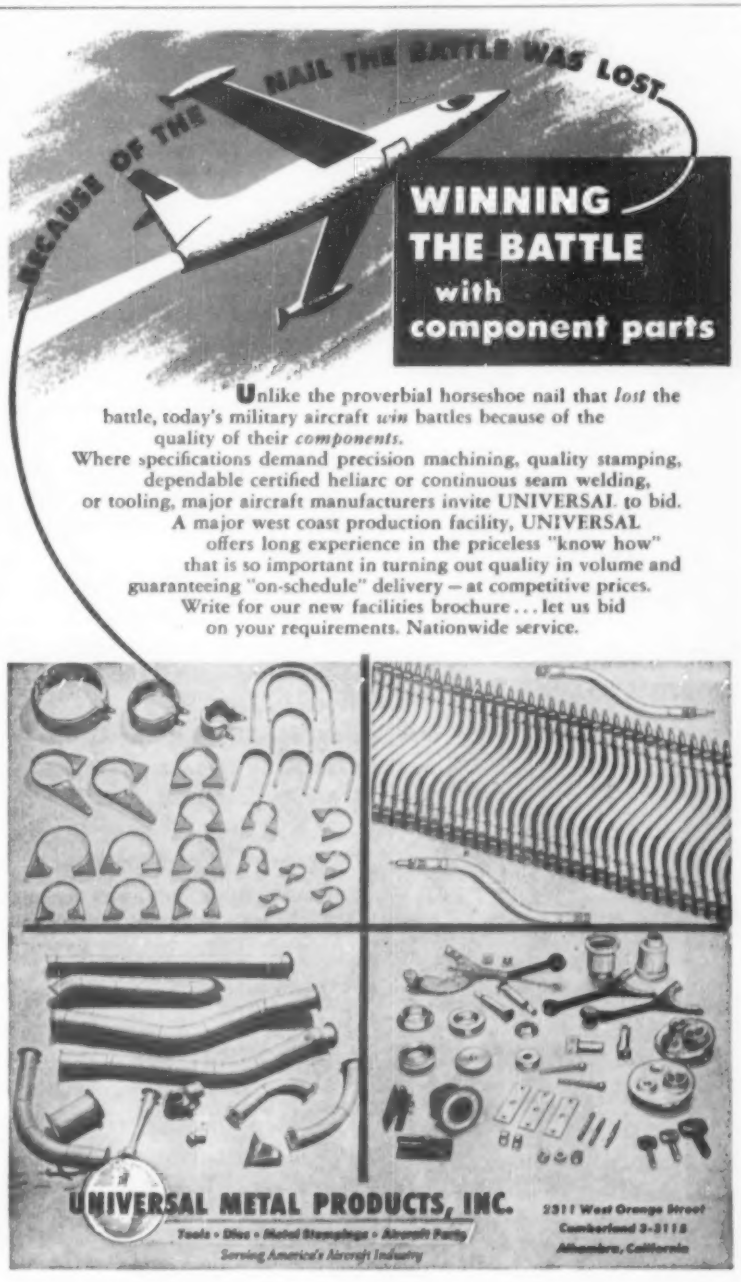
The chief pilot of Lake Central Airlines testified that pilots for the Bonanza operation were taught to make approaches for landing at 80 miles per hour indicated airspeed with landing gear down, flaps extended, and a slight amount of power. The aircraft manufacturer's handbook likewise recommends that 80 miles per hour indicated air speed be maintained on final approach, with landing gear down and flaps fully extended.

Facts and circumstances surrounding the two flights were further corroborated through the observations of two other controllers on duty at the time, an aircraft line service employe of the Roscoe Turner Aeronautical Corporation, and two U. S. Air Force pilots who were in a B-26 awaiting clearance to take off. The B-26 was on the taxiway near the approach end of Runway 31.

Following the accident, Board investigators timed with stop watches a number of approaches and landings of Constellations from a point about 300 feet from the end of the runway to the time the aircraft turned off the runway. Most of the observations were made on aircraft which had landed on Runway 31 and turned at the intersection of Runway 9. Only those landings in which propeller reversing was not used were clocked. The time spread was from 31 to 38 seconds. It was thus ascertained that the time separation between the approaches of the Bonanza and the Constellation was one-half minute or more.

Investigation disclosed that the Beech Aircraft Corp. had made a study of turbulence induced by aircraft. This study was completed shortly before the accident. Lake Central Airlines received a copy of the Beech report four days after the incident. It revealed that severe turbulence can be caused by any type of aircraft, but that the more frequent cases were reported by pilots who had experienced the phenomenon in either landing or taking off behind large aircraft.

The Beech safety bulletin advised pilots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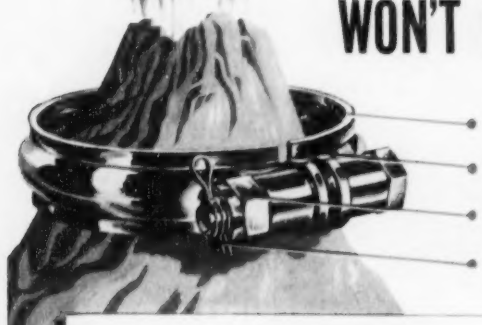

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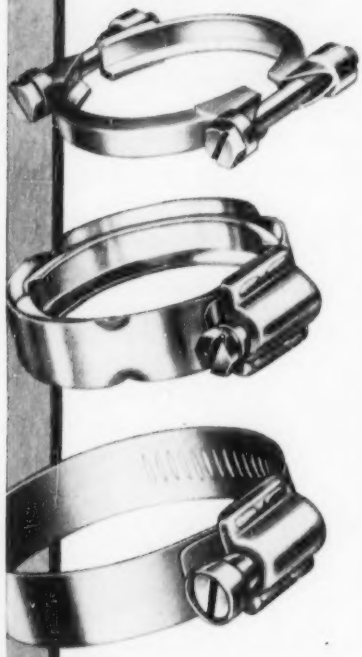

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that the induced turbulence is caused, basically, by the vortex from each wing tip and the swirling propeller wash. One report commented that the turbulence created by jet aircraft is considerably higher than that produced by propeller-driven aircraft. A number of persons reported conditions almost identical to those experienced by Capt. Haas. Several pilots had encountered severe turbulence while flying larger aircraft such as the Lockheed Lodestar, Douglas A-20, B-26, DC-3 and others.

Investigation by the Board showed that wing tip vortices are caused by the air at increased pressure under a wing tending to flow outboard around the tip to the area of reduced pressure above the wing. The magnitude of the vortices is dependent on several factors including the shape of the wing, the amount of lift being produced, and the angle of attack at which the wing is operating. The relationship of these factors is such that a large, heavy aircraft breaking its descent to flare out for a landing causes very powerful wing tip vortices. Extended wing flaps also can cause powerful vortices. Severe turbulence may be induced by the propellers, wing tips, and flaps, the severity depending upon the combination of circumstances and the aircraft involved.

On Mar. 3, 1952, the CAA issued a circular to each Regional Administrator requesting reports of incidents in which small aircraft had encountered dangerously severe turbulence when following large multi-engined aircraft.[4]

Following receipt of these reports, another circular[5] was prepared and distributed to all Regional Administrators a week subsequent to the accident. This latter circular stated that the various Regions had reported numerous incidents in which small aircraft had encountered turbulence both on the ground and in flight when following or crossing the thrust streams of multi-engined or jet aircraft. Control tower personnel were cautioned to be alert to situations which, if properly recognized and acted upon, could prevent such accidents. The circular pointed out that there are so many variables concerning large aircraft turbulence that it would be almost impossible to delineate specific procedures to cope with the problem.

Investigation disclosed that Lake Central Airlines, the aircraft, and the pilot were properly certificated.

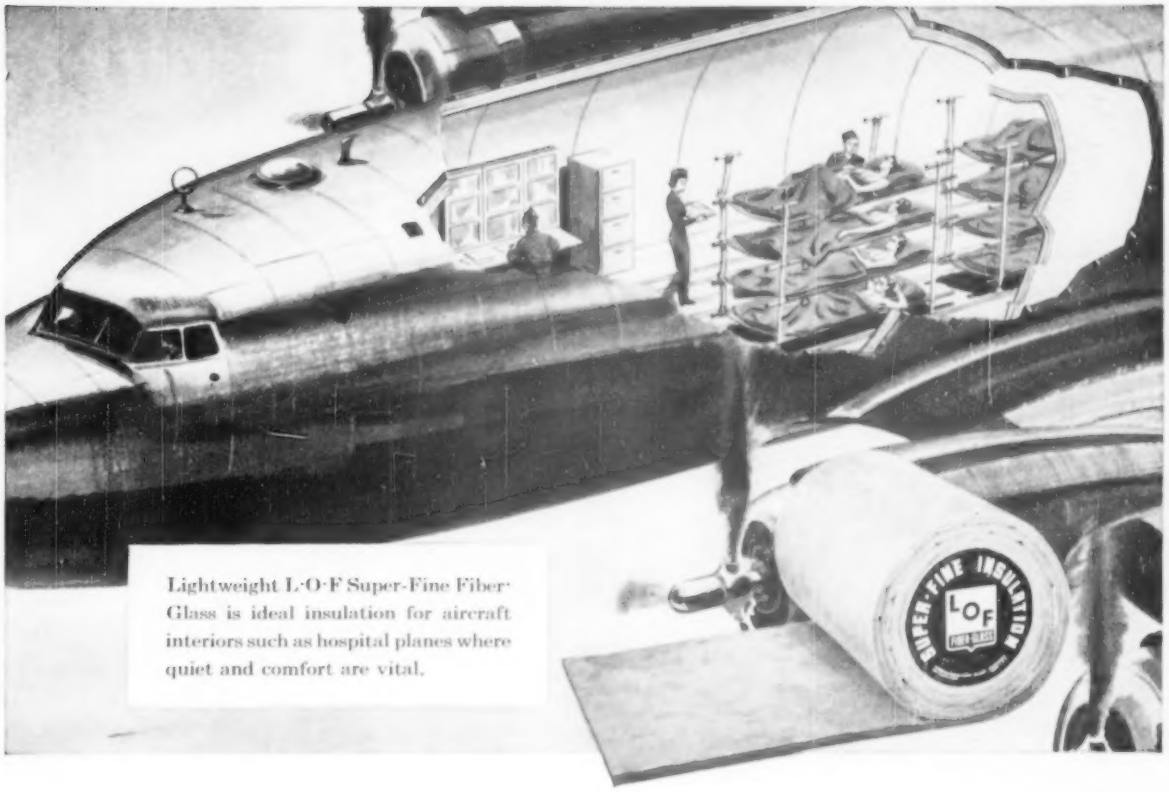
ANALYSIS

The evidence indicates that the Bonanza crashed as a result of severe turbulence in the wake of the Constellation. Weather was not a factor in this accident.

The accident could have been prevented had the Bonanza pilot conducted his approach with greater separation, and made the turn to final approach later. A higher approach airspeed might have prevented it or permitted the aircraft to be controllable

[4] Circular Letter W-380-105 from the Chief, Airways Operations Division, CAA, Washington, D. C., to all CAA Regional Administrators. Subject: Effect of Large-Plane "Turbulence" on Small Aircraft.

[5] Circular Letter W-380-213 from the Chief, Airways Operations Division, CAA, Washington, D. C., to all CAA Regional Administrators. Subject: Effect of Large-Plane "Turbulence" on Other Aircraft.



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in greater degree. Airspeed is definitely a factor in a pilot being able to maintain control and to effect recovery, for the margin of safety lies between airspeed and altitude. The final approach of the Bonanza was made in accordance with company procedures and air speed recommendations of the aircraft manufacturer, but the airspeed and altitude were insufficient for the unexpected condition which was encountered.

There has long been knowledge that the turbulence induced by any aircraft in flight can, under certain conditions, be hazardous. The degree of danger present in any particular portion of such turbulence is subject to many variables and cannot be accurately predicted. Though separation, both in time and distance was equal to or greater than normal, the turbulence encountered was of such violence that the Bonanza was thrown out of control. Thus the primary factor in the cause of this accident was a lack of full appreciation by both the pilot of the Bonanza and the controller that the turbulence created by the Constellation placed the Bonanza in jeopardy. The Board believes that the approach of Lake Central's Flight 4 and air traffic control functions were properly conducted, considering that both parties were of the belief that a normal situation existed.

FINDINGS

On the basis of all available evidence, the Board finds that:

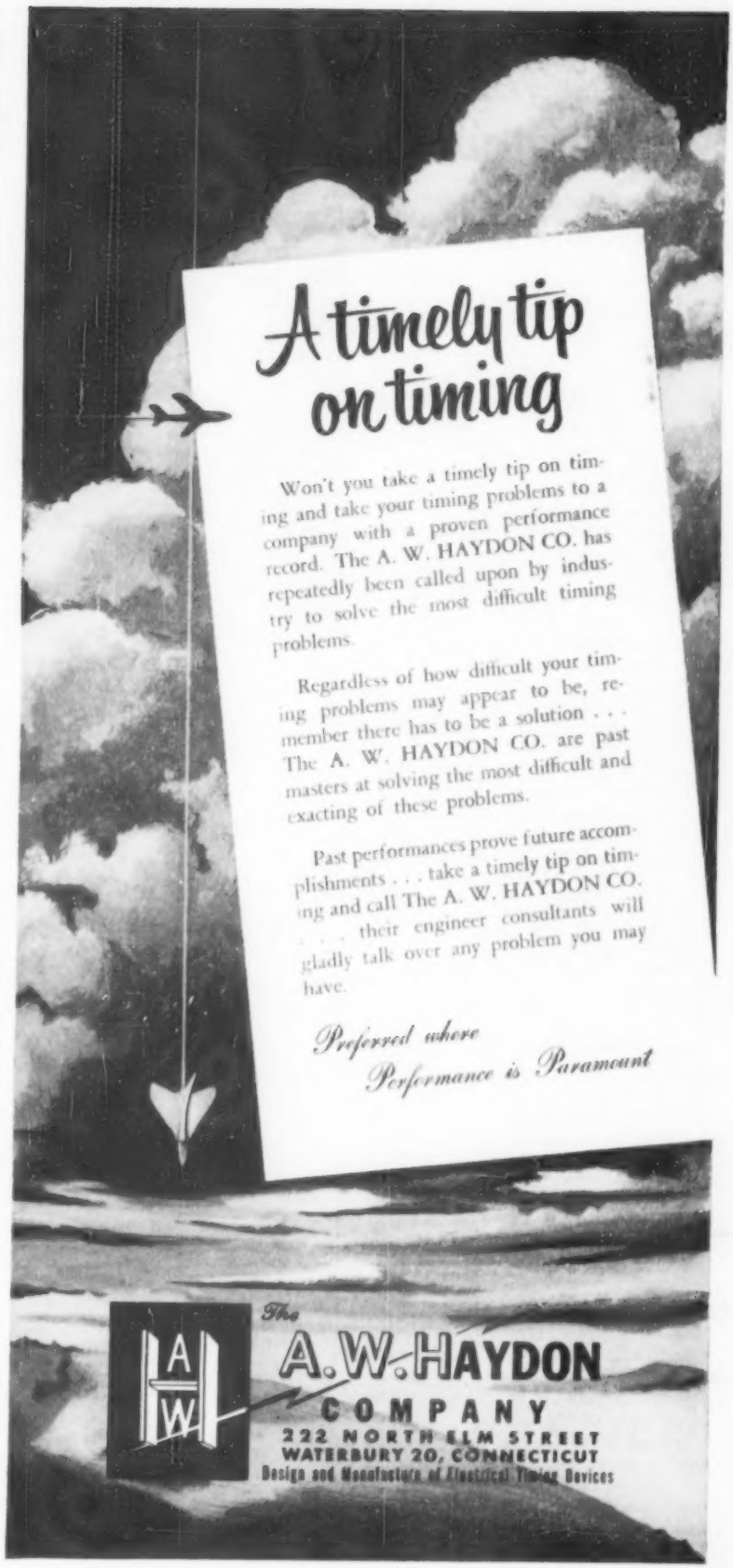
1. The carrier, the aircraft, and the pilot of the Bonanza were properly certificated.
2. There was no malfunction of any component of the Bonanza.
3. Weather was not a factor.
4. Airport traffic control functions were conducted correctly, with proper consideration and adherence to separation requirements between landing aircraft.
5. The approach and landing of the Eastern Air Lines Constellation were executed in accordance with tower instructions, and were normal in all respects.
6. The pilot of the Lake Central Airlines Bonanza, while making a normal approach unexpectedly encountered severe turbulence in the wake of the preceding multi-engine aircraft.
7. The Bonanza was thrown into an unusual attitude at an altitude of about 75 feet and approximately 350 feet from the approach end of Runway 31 when it entered the severely turbulent area.
8. The turbulence was so severe, and encountered at such low altitude, that recovery could not be effected.
9. Separation, while considered adequate by the pilot of the Bonanza and the controller, was in fact insufficient.

PROBABLE CAUSE

The Board determines that the probable cause of this accident was the fact that the final approach of the Bonanza was made so closely behind that of the Constellation that the Bonanza encountered an area of severe turbulence created by the preceding multi-engine aircraft and became uncontrollable, side-slipping to the ground.

By the Civil Aeronautics Board:

/s/ Oswald Ryan
/s/ Josh Lee
/s/ Joseph P. Adams
/s/ Chan Gurney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Fram Strikes Pay Dirt in Engine Oil

- **Tests evaluate filters in piston powerplants.**
- **Result to date: longer life for filtered oil.**

By George L. Christian

East Providence, R. I.—Are oil filters in aircraft worthwhile?

Mass evaluation of Fram filters in the oil circuits of two hundred R4360 engines on USAF C-97s and B-50s is currently under way to decide this.

▶ **For Big Drinkers**—One of the big variables, according to Dr. W. S. James, Fram's vice president-engineering, is an engine's oil consumption. If an engine drinks oil, constantly requiring addition of fresh lubricant, a filter is of little value because the oil does not stay in the engine long enough to become dirty.

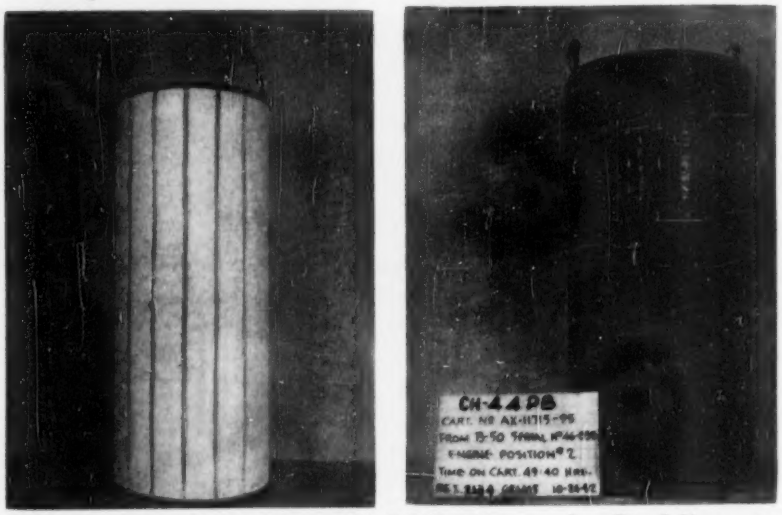
But if an engine is frugal and operates long hours without the addition of new lubricant, the oil recirculating in the engine picks up considerable dirt, and filtration appears to be worthwhile. Dr. James says under certain conditions, about one pound of dirt (or contaminant) can form in an R4360 engine for each 10 hours of operation.

With an oil filter, "you can keep dirt in your hip pocket until it can be thrown away," James says.

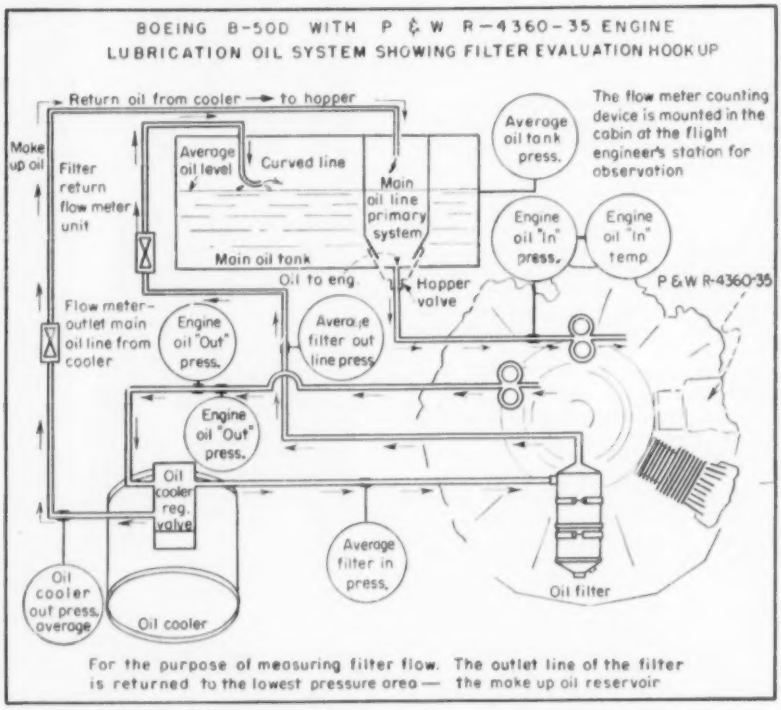
▶ **Current Conclusions**—A number of conclusions can be drawn from DIRs (Depot Inspection Reports) on eight R4360 engines removed from C-97 aircraft and overhauled at Warner Robins Air Materiel Area during the evaluation program. (Six of the engines were operated using Fram partial-flow oil filters, the other two were reference engines.) Among the conclusions:

- At the end of an average of 500 hours of operation, condition of filtered engines whose oil had not been changed or changed only once during the entire run was equivalent to or better than the reference, unfiltered engines, run the same length of time, but with complete oil changes every 100 hours.
- Engines equipped with Fram partial-flow oil filters showed very light sludge deposits in crankshaft, crank pins and other parts of the engine.

▶ **Savings Seen**—On a C-97, oil change involves some 35 gal. per engine or 140 gal. per plane. On B-50s, using the same powerplant, 60 gal. of the oil tank's 75 gal.-capacity is changed every 100 hours.



RESULTS INDICATED by tests on B-50's R4360 engines: one clean filter (left) separates sufficient sludge deposits (right) to make it equal to 30 gallons of oil.


BOEING B-50D WITH P & W R-4360-35 ENGINE
LUBRICATION OIL SYSTEM SHOWING FILTER EVALUATION HOOKUP
Return oil from cooler
to hopper
The flow meter counting device is mounted in the cabin at the flight engineer's station for observation
Make up oil
Filter return flow meter unit
Average oil level
Curved line
Main oil line primary system
Average oil tank press.
Engine oil "In" press.
Engine oil "In" temp
Main oil tank
Oil to eng.
Hopper valve
P & W R-4360-35
Flow meter-outlet main oil line from cooler
Engine oil "Out" press.
Average filter out line press.
Engine oil "Out" press.
Oil cooler reg. valve
Average filter in press.
Oil cooler out press. average
Oil cooler
Oil filter
For the purpose of measuring filter flow. The outlet line of the filter is returned to the lowest pressure area — the make up oil reservoir

This leads to some interesting and pertinent comparisons. If the filter element is changed every 50 hr. of engine operation, one element is equal to 30 gal. of oil on a B-50 engine. In terms of weight, space and cost, here is what is saved:

- **Weight.** In round figures, 30 gal. of oil weighs 210 lb., a filter element 3 lb.; element weighs 1/70 of the oil it saves.
- **Space.** The 30 gal. of oil takes about 4 cu. ft. of space, the element measures 6 x 6 x 16 in. or 1/3 cu. ft.; element requires 1/12 the space the oil does.
- **Cost.** The 30 gal. of aviation oil

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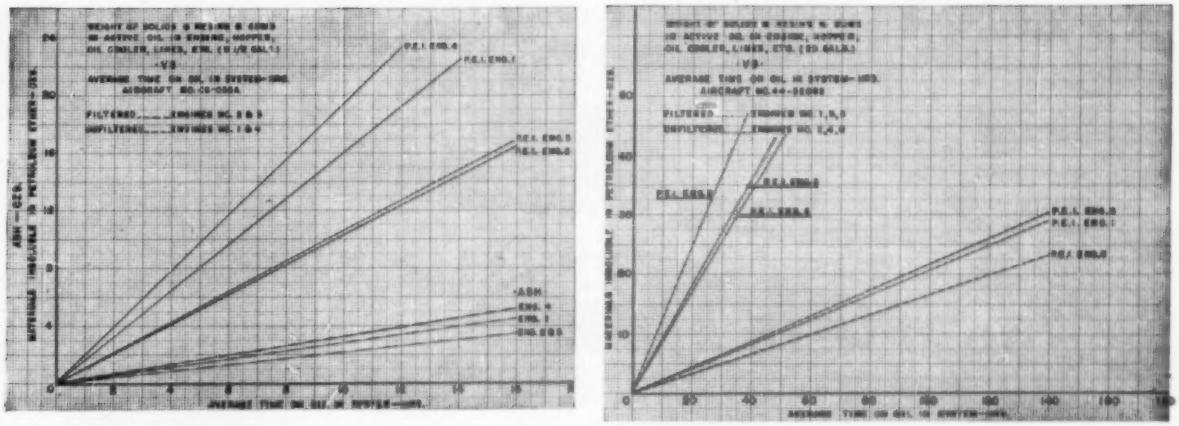

GRAPHS COMPARE residue in filtered and unfiltered B-50 (left), B-36 (right) engines.

costs about $12, a filter element $5.88. The filter element costs about half as much as the oil.

Translated into logistics, the savings in shipping space, storage, and cost are impressive.

These are not the only economies attributable to filtering aircraft engine oil, James points out. Other economic factors that will be significant when time for final evaluation comes, according to James:

Since filtered engines are often in better condition than unfiltered counterparts, savings in manhours required for servicing and overhauling engines can reasonably be anticipated.

Reduced spare parts requirements and extension of overhaul periods may be expected. Less sludge in the engine should logically reflect in greater reliability, with corollary savings of time and money. Fewer oil changes mean reducing the number of oil trucks required for a given fleet of aircraft, less truck maintenance and lower operator cost.

▶ **TWA Too**—Trans World Airlines is testing Fram's aircraft engine filters on the #2 and 3 engines (Wright C18BA-3) of a Model 049 Lockheed Constellation.

The #3 engine was prematurely removed at 482 hr. for flattened exhaust cam roller, but #2 engine operated its entire overhaul life of 1096:45 hr.

The filter element on this engine was changed every 85 hr. regardless of condition because a maintenance operation was performed at this interval. The first type of element used had tended to clog at about 20 hr. of use, but the second type eliminated this problem. Oil was changed every 410 hr., as recommended by Wright Aeronautical Corp.

The test was completed and reported on in March 1952. The report stated that use of the filter reduced amount of sludge build-up in crank pins and impeller drive assemblies, and nose section parts were cleaner than usual.

▶ **More Tests**—TWA engineers decided to extend the oil filter test to 10 engines to run for their entire overhaul period. This test was started in March 1953. Here is what is being checked:

• **High-wear points** Five sets of high-wear points will be weighed to an accuracy of one milligram. (Fram engineers point out that for purposes of these tests, loss of weight is a more accurate measure of wear than dimensional checks.) Two sets of parts were installed in filtered engines, three in unfiltered reference engines.

The high-wear parts being checked include bronze pinion ring bearings and reduction gear pinion carrier bushings in nose reduction gearing (40 units); primary pinion carrier bushings (16 units;) and front and rear master rod bearings.

• **Filter elements & oil.** Filter elements are being pulled every 110 hr. (a regular overhaul period for TWA engines) and returned to Fram with a quart of oil from the same engine for analysis. Some 40 filters have been returned to date. Although no final conclusions are yet available, this fact has been learned: Of the 40-odd cartridges sent for analysis, some have filtered out 3–4 lb. of dirt during their 110-hr. installation; the average is about 2–3 lb.

TWA installed the filters, (supplied free of charge by Fram) in parallel with the oil cooler. In this by-pass-type filter installation, oil coming out of the engine is directed to both oil cooler and oil filter. Filter and cooler oil-out join and dump into oil tank. With a new, clean filter, about 20% of the oil passes through the filter and 80% through the cooler. Oil through the filter diminishes progressively as the element becomes clogged. With such a rig, should filter become entirely clogged, all the oil would pass through the cooler without impairing oil supply to the engine.

Fram expects that each engine will use 10–12 cartridges and that TWA's test program will last another month or two. Oil is still changed every 400 hr.

▶ **Exploratory Program**—M. Dobrolet, Fram's chief engineer, emphasizes that Fram's aircraft engine oil filtration program is of an exploratory nature, both in the laboratory and in flight tests. This is true of the work being done with TWA, AF and Navy.

The stated goal is "to determine the economic value of engine oil filtration as applied to piston-engine aircraft." All laboratory work—analysis of used oil and dirt on used cartridges—is done entirely in connection with flight tests. Laboratory tests reveal what kind and what quantity of dirt the filters remove from the oil.

Final evaluation will be determined by condition of the engines themselves.

The filter bodies being supplied to the various users are standard commercial units manufactured for other industries. The only concessions to aircraft installation are slight changes made in the fittings, and provisions for safety-wiring the units. James emphasizes that if Fram develops filters specifically for aircraft, many refinements could be incorporated resulting in space- and weight-savings, and reducing present plumbing complexity considerably.

For instance, filter cartidge could be installed in the oil tank, oil tank hopper or the oil cooler header, eliminating the 14-lb. weight of the filter body and all the extra plumbing now required. Cost of making an installation is about $50 per engine, Fram estimates. Cost of the cartridge is $5.88.

When the oil filter program first started, James says, neither Fram nor the Air Force has had any precedent to go on. Both did a lot of groping around. The first filters selected were chosen on the basis of an educated guess. Fram chose two standard commercial oil units of reasonable capacity to submit to the USAF. Only after much experimenting by both Fram and the Military, did the pattern of what was needed begin to be clarified.

One thing was certain, however, the

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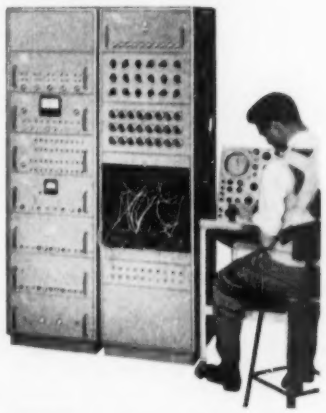

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M-9

REPLACEMENT cartridge is used for jet engine filter being developed by Fram.

filters did collect a lot of dirt.

▶ **Method of Evaluation**—The dual yardstick used by Fram to evaluate the effectiveness of its filter installations are how much petroleum ether insolubles (PEI) and how much solids the filters trap. PEI includes resins and gums; solids mean ash.

The PEI, or dirt, in a filtered engine's oil is about 50% of that in oil of an unfiltered engine, tests showed. The accompanying graphs show the difference in PEI and ash content in filtered and unfiltered engines (one on a B-50, the other on a B-36).

▶ **How It Started**—Back in 1946–47, Fram started initial discussions with Wright Field concerning filtering engine oil. The particular problem concerned a hydraulically driven fan on the B-36 which tended to sludge up. The program died. In 1950 it was revitalized and a flight installation was made on three of a B-36's six reciprocating engines.

The hook-up was crude. It took some 25 ft. of ¾-in. hose, plus an assortment of brackets and fittings. The filter was hooked up in parallel with the cooler to provide a fail-safe set-up. In case the filter clogged, all the oil would pass through the cooler. A fixed restriction limited the amount of oil that could flow through the filter to assure that enough oil would go through the cooler to keep oil temperatures within operating limits. Later arrangement moved the filter next to the cooler, considerably shortening the length of hose required. The filter was tapped right into alternate ports in the oil cooler control valve assembly.

The first few flights indicated that the filters were not giving the results they should. It was found that the location of the filters allowed oil passing through them to congeal when plane was flying at high, frigid altitudes, stop-

ping oil flow through the units.

Then, the B-36s spent so much time on the ground that accumulation of data was painfully slow.

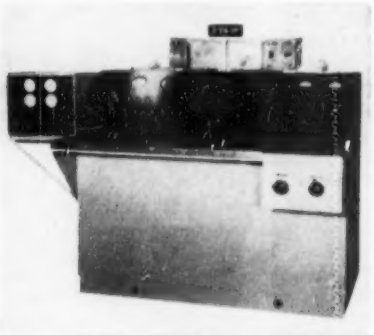
In 1951, the program was shifted to B-50s at Offutt AFB, Strategic Air Command headquarters. Greater flight availability of SAC's B-50s, which carry the same R4360 powerplants as the B-36s, made the shift desirable. Here the first completely instrumented filter installation was made. Instrumentation included:

- **Pressure.** Engine oil-in, engine oil-out, filter oil-in, filter oil-out, oil cooler-out, average oil tank pressure.
- **Temperature.**. Engine-in, engine-out, filter-out, ambient air.
- **Flow.** Filtered oil-out, oil cooler-out (non-filtered). Potter electronic flowmeters were used to record flows.

This rig showed that the filter element, which was used 146 hr., was probably expended at 100 hr., and had reached the end of its useful life between 50–60 hr.

► **Past, Present, Future**—Fram started in 1934 as a metallurgical laboratory. The founders had the idea that automobile engine oil could be re-refined while the engine was running.

With less than $18,000 and a handful of employes, they went to work. They tried all sorts of filtering elements, including peanut shells. Eventually, they came up with a successful combination—cotton waste impregnated with a chemical of the amine family. The chemical increased cotton's natural affinity for carbon deposits in the engine



SYNCHRONIZER CHECK

Synchronizers for Hamilton Standard propellers on two- and four-engine aircraft are checked out on this new test stand recently developed by Greer. Prop motion is simulated by an electrically energized mechanical drive system. Aircraft vibration is also reproduced in this stand. Operation is indicated on four cathode ray oscilloscopes which provide a series of dot patterns resulting from impulses generated by the synchronizer's commutator switches. A later model will combine oscilloscopes into one and provide static as well as operational tests. Greer Hydraulics, Inc., 454 18th St., Brooklyn 15, New York.

VICKERS VISCOUNT

FOUR ROLLS-ROYCE DART PROPELLER-TURBINE ENGINES

Trans-Canada Air Lines are to introduce the Viscount on their inter-city services towards the end of 1954. It will then become the first turbine-engined airliner to operate in North America.

VICKERS-ARMSTRONGS LIMITED · AIRCRAFT DIVISION · WEYBRIDGE · SURREY · ENGLAND

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...and know when every bolt is tensioned exactly *right!*

For the hundreds of operations where bolt tension is specified, Snap-on Torqometers are standard throughout the aviation industry. As easy to use as an ordinary wrench, Torqometers indicate required torque with hairline accuracy. *Readings are consistent* . . . accuracy is not affected by the way the wrench is held. Snap-on Torqometers are built in 15 standard models, capacity from 0 to 30 inch-pounds up to 2,000 foot-pounds. A nearby Snap-on factory branch warehouse is ready to serve your requirements with a complete line of 4,000 hand and bench tools. Write for Snap-on catalog.

SNAP-ON TOOLS CORPORATION
8020-F 28th Avenue, Kenosha, Wisconsin
*Snap-on is the trademark of Snap-on Tools Corporation.

oil. Although several other filtering media are used today, chemically treated cartridges are still Fram's largest-selling item.

Now Fram filters not only oil, but fuel, water and air for aircraft, industrial marine, automotive and other installations. One of its latest developments is a series of filters for jet engines, for both fuel and oil applications.

Considerable effort has gone into making filter components as standard as possible to promote interchangeability, make production easy and keep costs down.

Fram's total sales in 1952 exceeded $20-million, only a small percentage going to the aircraft industry. But Howard E. Robinson, Fram's vice president-sales, anticipates a substantial increase in aviation activity in 1953.

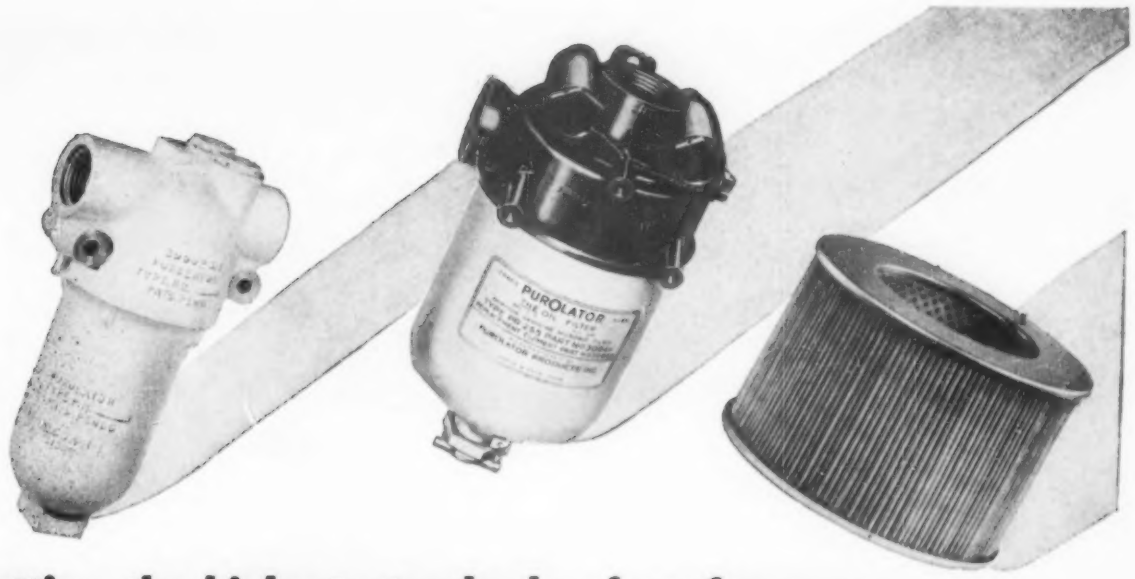
Currently employing some 1,700 persons, the firm claims to be the "world's largest producer of oil filters and cartridges."

OFF THE LINE

California Central Airlines recently entered into a contract with American Airlines to handle AA's radio line maintenance on the airline's DC-6 air tourist flights terminating at Lockheed Air Terminal, Burbank, Calif. Under the agreement, Cal Central's radio maintenance facilities and technicians will be available to all American air tourist flights, as required. All other DC-6 maintenance will be handled by AA's crews at Burbank.

Mounting passenger seats on tracks so that spacing may be easily changed from deluxe to standard to high-density seating arrangements simplifies interior conversions, but the various seat spacings pose a problem. Seat lights, call bells, individual ventilators and cabin windows are fixed, making it difficult for passengers to avail themselves of the services or look out of the window with some seat arrangements. One airline spokesman suggests that airframe manufacturers put the seat light-call bell-ventilator arrangement on a sliding plaque. Such a setup would make it possible to put these services within reach of passengers regardless of seating arrangement. Nobody has quite figured out what to do about shifting the windows however.

Stratos Division of Fairchild Engine and Airplane Corp. has received a $2.5-million contract from Navy for air turbine alternator drive spares. Stratos Model TP15 alternator drives are used on the Chance Vought F7U-3 Cutlass and the McDonnell F2H-3 Banshee.



Setting the highest standards of performance and dependability in aircraft applications...

PurOlator Filters

WHEN YOU SPECIFY Purolator filters, your choice is backed by the world's largest filter research and engineering laboratories, *plus* the world's largest specialized filter production facilities.

This means that Purolator* filters are as perfect as engineering skill, a quarter-century of experience, and modern manufacturing methods can make them. Because of their outstanding record of dependability and high performance, Purolator filters are specified as standard equipment in modern military and commercial aircraft.

Only in Purolator filters can you find the famous Micronic* element . . . capable of filtration down to *submicrons* (.0000039 in.), at higher flow rates than ever before obtained for such fineness of filtration. For example—the Purolator Micronic Filter PR-255, for aviation fuel, removes all particles down to 10 microns at initial pass and increasingly smaller subsequently, yet provides a conservative 300 gallon-per-hour flow rate in a unit only 5⅜ in. by 10¼ in.!

- ✔ **Fuel**
- ✔ **Hydraulic**
- ✔ **Air**
- ✔ **Lube**

There is a well engineered, "AN"-approved Purolator available for any aircraft requirement. For further information, write for the Purolator Aviation Catalog, which contains specifications of more than 30 different use-tested and approved Purolators designed especially for aircraft applications.

*Reg. U. S. Pat. Off.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices: Chicago, Detroit, Los Angeles

PUROLATOR
WORLD'S FINEST **OIL FILTER**

MALAYA—Sikorsky S-55 and S-51 helicopters have strengthened British forces in Malaya, where their ability to operate without prepared landing fields is particularly valuable, in the struggle against communist guerrillas. Here a group of S-55s flies in review at the Royal Navy Air Station, Gosport, England, before embarking for Malaya on a British aircraft carrier. They were supplied under terms of the Mutual Defense Assistance Program.

AROUND THE WORLD WITH SIKORSKY HELICOPTERS

KOREA—A mine-spotting Navy Sikorsky HO3S helicopter takes off from its floating base on the deck of an LST somewhere off Korea. From a hovering position, its pilot can spot submerged mines not visible from shipboard. With helicopter-minesweeper teamwork, safe channels can be cleared quickly, and danger reduced to a minimum.

LABRADOR—Pilots of Marine Air Group 26 gave their HRS Sikorskys a workout over the bleak Labrador coast recently in training maneuvers. Specialized tactics, made possible by the extreme mobility and utility of helicopters, were tested in ship-to-shore operations. The Sikorskys were based on the aircraft carrier U.S.S. Kula Gulf.

HOLLAND—When the raging North Sea inundated lowland areas of Holland and England, thousands of victims were carried to safety by helicopters from American, British and Dutch military units. Sikorsky S-55 and S-51 types again demonstrated helicopter versatility, rescuing victims from the flood and bringing in relief supplies. Here an R.A.F. S-51 lands on a road isolated by the flood.

SIKORSKY AIRCRAFT

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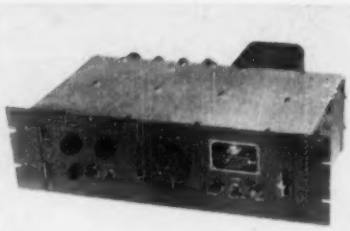
NEW AVIATION PRODUCTS



Space-Saving VHF

A new VHF receiver is tailor-made for crowded installations where space is tight and a large number of units is required, such as at airports, communication centers and the like. Schuttig and Co., Inc., is the manufacturer.

This model, S220A, is said to be highly selective. Bandwidth at the 6-db. point is ± 20 kilocycles; at the 60-db. point, ± 100 kilocycles. The set requires 40% less rack space than similar types, the company says.

Sensitivity is cited as another strong point of the unit. A one-microvolt signal modulated 30% provides one watt audio output at 10-db. or better signal-to-noise ratio. A quick-response squelch circuit operates to quiet the receiver except when signals of desired strength are received. This circuit operates at levels down to one microvolt, rejecting noise of lower levels. Output is kept constant within one decibel at all input levels between five and 200,000 microvolts.

Schuttig and Co., Inc., Ninth and Kearny Sts., N. E., Washington, D. C.

Tough Silicone

A new silicone rubber coating, useful for avionic and other applications, has greater toughness and higher dielectric rating than any other, its maker, General Electric, claims.

The product promises to permit elimination of metal cans now needed to protect coils and other avionic components. Its rated physical and electrical strength is retained over a wide temperature range, from —60 to 316C. Aside from its electrical applications, it can be used for engine gaskets and flexible heater ducts. GE officials predict it will find wide application in Class H insulation in equipment exposed to moist, hot conditions.

The product, SE-100, also is suggested as a means of overcoming cracking problems inherent in brittle resin products. It can be coated on glass tapes, wrappers and other insulating materials at lower cure temperatures and about 30% faster than previously possible, GE claims. The material also can be used for dipping or encapsulating. It is supplied as a 100% solids material or as a 35% solids dispersion in xylene (SE-100S).

► **Cold-Resistant Silicone**—Another silicone rubber, SE-550, previously announced by GE (AVIATION WEEK Feb. 2, p. 77) is called by GE "the world's most cold-resistant elastomer" (remains flexible down to —120F). It has found use in critical applications in the huge Douglas Globemaster cargo plane. The rubber is being used as gasketing on the astradome, pilot's access window and two emergency hatches. It also has been proposed for the clamshell loading doors of the big plane.

An important safety advantage cited for this material is that it doesn't stick to metal after long inactivity and bind seldom-opened escape hatches.

Chemical Dept., General Electric Co., Pittsfield, Mass.

Non-Shorting Switch

A single-deck single-pole rotary switch designed for control of complicated circuits in experimental equipment has been developed by Shallcross Mfg. Co.

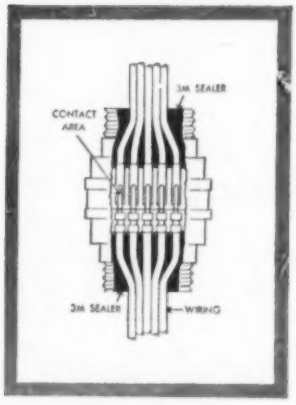
The switch is made in two models, one with 36 positions, the other 60. The rotor arm lifts from contact to contact, instead of sliding, allowing closer spacing between contacts without shorting. Current-carrying capacity for these switches is 30-40 amp.

Shallcross Mfg. Co., Collingdale, Pa.

Environment Tester

A chamber designed to provide some of the toughest altitude and environmental conditions required by the military has been installed at the Gavco Corp. plant for testing its avionic equipment.

The stand paces components through all tests outlined in MIL 5272 and



Keeping your power dry!

Protecting our shores from invasion is only one of the jobs assigned to Navy aircraft. Another task, equally important, is for the plane to protect itself against its own "natural" enemies.

For instance, consider the possible effects of salt air and water, of moisture condensation, of vibration on the electric wiring that delivers power throughout the plane. How quickly these elements would destroy the aircraft—if not checked.

To help protect these power lines, 3M, working with McDonnell engineers and the U.S. Navy, developed EC-1120PC—a potting compound, not affected by vibration, that provides a permanent seal for wiring in plugs against moisture and salt air. It helps to keep your power dry!

See what adhesives can do for you . . .

Like to know more about EC-1120PC . . . or other 3M products designed expressly for aircraft use? Then, by all means, call in your 3M salesman, or write in for your free copy of our 12-page aircraft booklet. Address your request to 3M, Dept. 116, 411 Piquette Ave., Detroit 2, Michigan.

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You now can have a lightweight, continuous-duty, explosion-proof motor. This new construction in integral horsepower ratings represents another Westinghouse "first" in the Aviation Industry.

A revolutionary d-c motor—it is completely self-contained. Ducts or other external ventilation equipment are not required. Unique flame suppressors and other exclusive design features permit continuous-duty operation under extreme conditions of temperature and altitude. For instance, the motor pictured above has excellent operating characteristics from sea level to 50,000 feet.

These motors cover a range from 1¾ to 5 horsepower and weigh from 18 to 42 pounds including accessories. Motors are available with standard AND pads or with special mountings. Radio noise filters and gear reductions are optional. These motors meet the explosion-proof and environmental requirements contained in military specifications.

Investigate these new motors. Call your nearest Westinghouse representative today, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-03009

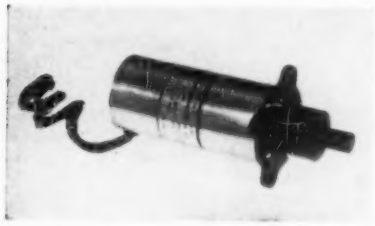
YOU CAN BE SURE...IF IT'S

Westinghouse

MIL 41065B. Built for Gavco by the Northern Zalesky Co., it is designed to duplicate moisture, temperature and pressure conditions found anywhere on earth and simulate flights to 90,000 ft. altitude at rates of climb faster than any interceptor yet produced.

Components, placed in an 8-cu. ft. chamber, can be viewed through a 6½-in. glass window. The stand makes it possible to perform complete weather tests on new devices while they are in operation.

Gavco Corp., 540 E. 80th St., New York 21, N. Y.



Torque Producer

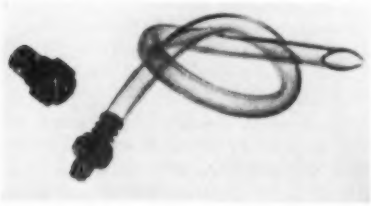
A miniature motor-driven planetary gear reducer designed to provide maximum output in the smallest space in missile and aircraft has been developed by Globe Industries, Inc.

The gearing system is available in 18 different ratios from 17.8:1 to 21,808:1. It is enclosed in the same cover with a 1/100- or 1/50-hp. Moto-Mite, a tiny permanent magnet d.c. motor produced by the firm for precision airborne accessory equipment. The torque output varies with the gear reduction, up to a maximum continuous of 1,000 oz. in. for the higher ratios.

A planetary gear system was selected because it generally can provide higher torques in a small space than a conventional spur gear reduction, Globe notes.

The standard unit is supplied with a ⅜-in.-diameter output shaft ½ in. long, and a four-hole mounting flange.

Globe Industries, Inc., 125 Sunrise Pl., Dayton 7, Ohio.



Self-Closing Drain

A new drain attachment scheme prevents oil spillage during draining of aircraft engine oil sumps which are difficult to reach with pans or buckets. It is being marketed by Technical Development Co.

Main items are a self-closing mag-

pinpoint
precision

Norden designers, engineers, researchers are never satisfied. Yesterday's product must be made better today. The design, development and production of instruments and systems for today's high speed aircraft and missiles — and for even faster ones tomorrow — must incorporate accuracy approaching absolute perfection.

This is where Norden plays its role as a leader. One example: the Norden true air speed system, already in service, which incorporates a mach meter computer of remarkable accuracy. It, with other Norden developments, gives meaning to Norden's reputation — instruments and systems of highest precision.

Norden
instruments and systems of highest precision

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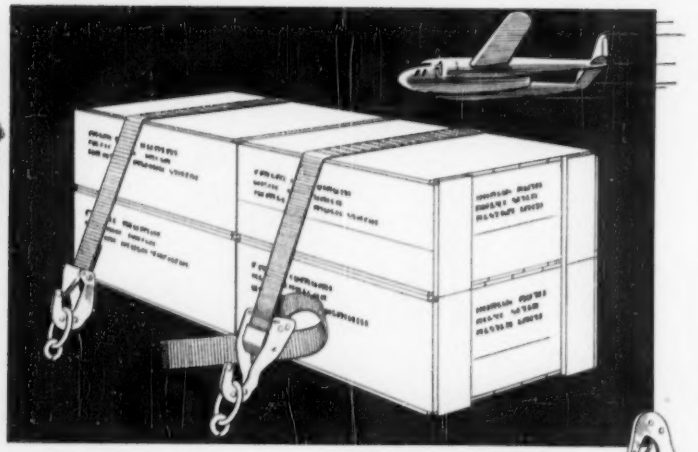

Secure in Flight!

Held in place—no matter how severe the flight or landing condition!

Eastern's "TYZEM"* line of cargo tie-downs does exactly that. They are widely used in Air Force heavy cargo aircraft, ranging from 1,250 pounds (shown) to 35,000 pounds rated capacity. Write for brochure.

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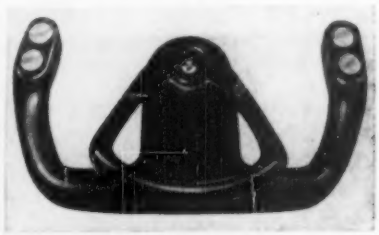
AIRCRAFT SENSENICH PROPELLERS

netic drain plug assembly that allows removal of the plug without opening the sump, and an A-730 drain attachment with hose which, on being inserted after removal of the plug, opens a special valve to allow oil to flow out.

Technical Development Co., 1228 Cherry St., Philadelphia 7, Pa.



Control Wheel Steers

A new dual-purpose cockpit control wheel that combines the functions of nosewheel steering and control surface operation has been made available by Adams-Rite Mfg. Co.

The wheel, actually two wheels in one, is designed to the latest type W configuration to give maximum instrument visibility. It makes operation of the nose wheel independent of control surface movement, yet convenient. The dual controls operate on shafts with common centers. Switch and grip configurations can be arranged to fit customer requirements and the plane-owning firm's insignia or trademark can be included on the wheel.

Adams-Rite Mfg. Co., 540 W. Chevy Chase Drive, Glendale 4, Calif.

ALSO ON THE MARKET

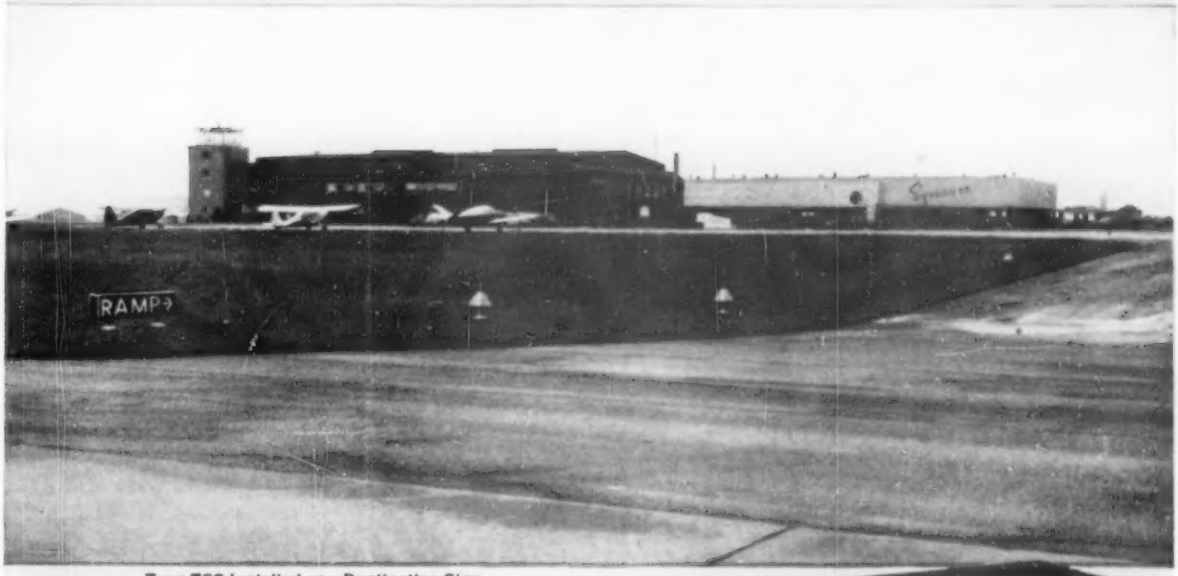
High-nickel-alloy strip in thin gauge and foil, precision rolled to close tolerances (±.0001) to meet exacting aircraft specifications is being produced in small and large lots for development and high production needs.—American Silver Co., 36-07 Prince St., Flushing, N. Y.

Bench-type component test chambers developed to military requirements are capable of rapid changes over wide range, down to −185F and as high as 250F in some models. Application of heat is accomplished through reverse cycle refrigeration, intended to eliminate hazards of open heating elements and simplify controls.—Webber Mfg. Co., Inc., 2740 Madison Ave., Indianapolis 3, Ind.

Turntables for use with assembly-line rollers and gravity wheel conveyors permit products to be diverted off at any angle from main conveyor flow, or to pass straight through.—Sage Equipment Co., 31 Essex St., Buffalo 13, N. Y.

Speed up traffic on YOUR airport with

CROUSE-HINDS Taxi Guidance Signs



Type TGS Installed as a Destination Sign

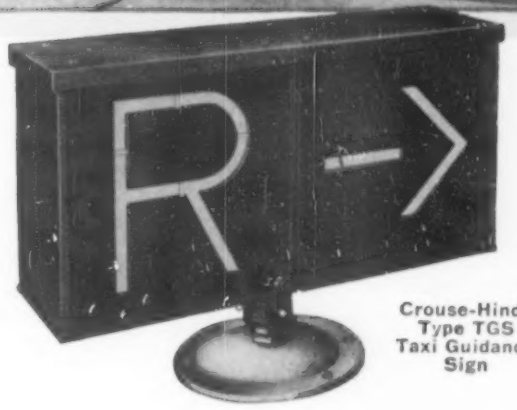
Release tower operators from a "traffic policeman's" duties . . . night and day.

The use of Crouse-Hinds Type TGS Taxi Guidance Signs provides a system of taxiway guidance that shows the pilot his location at each intersection and tells him exactly how to reach his destination. This relieves the tower operator of most of the work of directing ground traffic and leaves him free to concentrate on his real job . . . . directing airborne traffic.

The layout of a sign system should conform to CAA Technical Order TSO-N23. Destination signs are placed on the far side of an intersection, showing a destination symbol and an arrow. Intersection signs are placed on the near side of an intersection, showing numbers to identify runways or letters to identify taxiways.

The sign replaces the "entrance-exit" light which is normally at the start of a line of taxi lights. *An existing taxi light can be easily converted to a guidance sign.*

The housing is of lightweight, aluminum, box-type construction, mounted on one or more breakable couplings, all in accordance with CAA Specification L-829. Each number or symbol is in a 14-inch square interchangeable cast aluminum panel. The numbers are made with an orange-yellow plastic on a black background that gives excellent legibility in the daytime or when lighted at night. Signs vary in length from one to six sections. Each section is detachable so signs are easily converted from one size to another.



Crouse-Hinds Type TGS Taxi Guidance Sign

These signs are built to Crouse-Hinds high standard of quality . . . to give years of dependable service.

Now is the time to plan the installation of a taxi guidance system for your airport. Send for additional information.

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LANDING THE F-86 SABRE JET ON TWO FINGERS... FINGERS FORGED BY UTICA

When the North American F-86 Sabre Jet swoops in for a landing, two steel fingers control the landing shock. Like fingers in a dike, the pins meter hydraulic fluid through a small orifice to cushion the landing. Varied contour of the pin serves to vary resistance developed.

These pins are UTICA forgings, and point up an unusual development story. Under conventional forging methods, they would be expensive to produce because of immense machining required. Forging is practical only because UTICA has a "short-cut" production method for upsetting far greater than the standard three diameters.

They start by upsetting 15⅓ diameters

Each pin starts as a ¾" diameter, 21½" bar of SAE 4130. In one of UTICA's electrical upsetting machines 11½" is upset—*more than half the bar and, actually, 15⅓ diameters!* The bulb on the end is forged to rough shape, then machined to final dimensions. The UTICA forged part replaced the original part which was welded and required extensive machining. The new full-forged part has greater strength and requires much less machining. We are very proud the Cleveland Pneumatic Tool Co. picked UTICA Drop Forge for this important defense job.

New forging techniques ready for tomorrow

In defense production, UTICA has helped pioneer new techniques in forging both the old and the "new" hard-to-handle metals. Perhaps we can serve you—*tomorrow . . .* with forgings for advanced new products that will be tomorrow's leaders.

Our new booklet "File Facts on Precision Forgings" outlines UTICA'S methods and facilities, now totally engaged in defense production, but ultimately generally available. Send for your free copy.

Jobs available for technically trained personnel.

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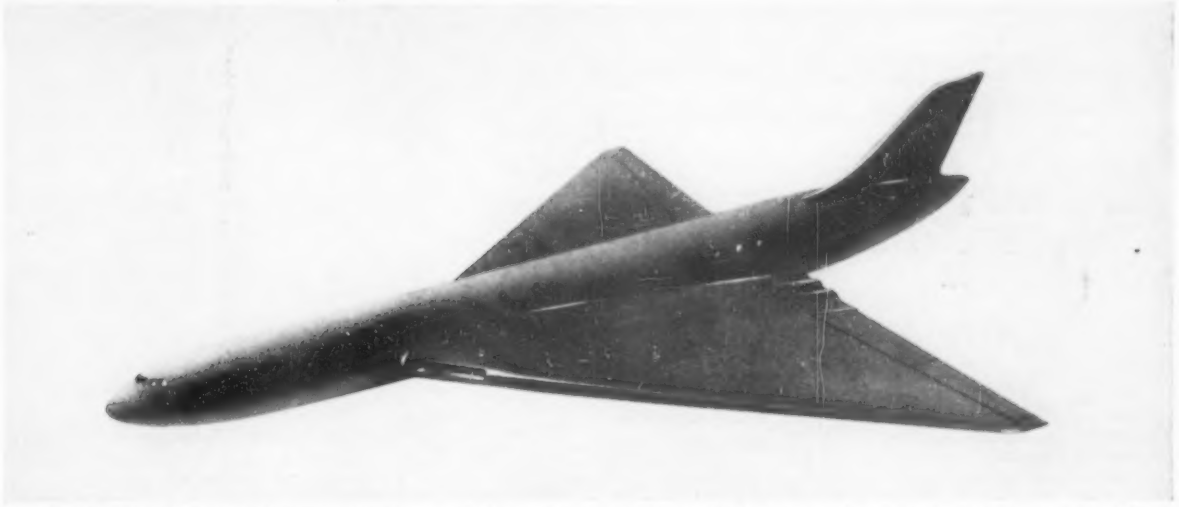


AVRO ATLANTIC jet (artist's conception) is one of the entries BOAC is considering as a replacement for its Comet 3A. Atlantic deliveries can be made in 1958 if orders are placed now, says company's chairman, Sir Roy Dobson.

BOAC Shops for Successor to Comet 3

- **Four firms offer designs for 150-seat airliners.**
- **VC-7 holds inside track in contract competition.**

By Nat McKitterick
(McGraw-Hill World News)

London—Within a year British Overseas Airways Corp. will pick its successor to the Comet 3, BOAC chairman Sir Miles Thomas forecasts.

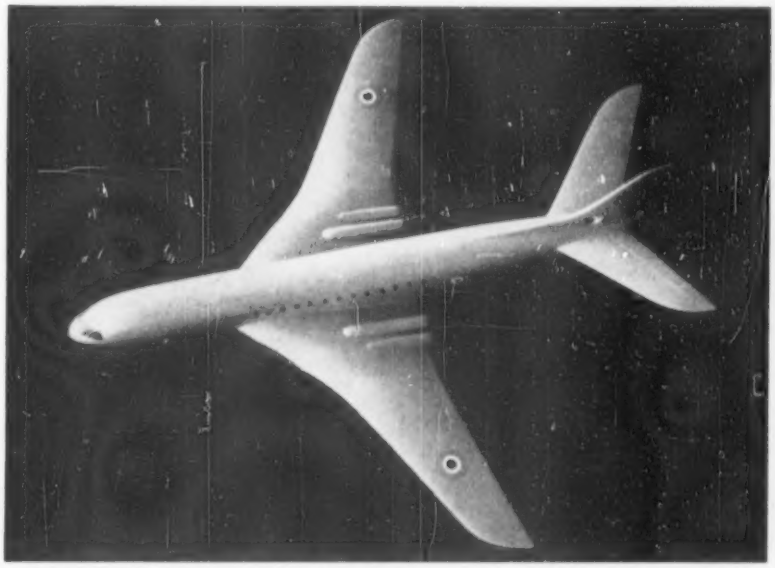
Sir Miles told a press conference he hopes to have his next jet carrier—a trans-Atlantic transport in the 200,000-lb. class—"at least doing route familiarization in 1958." To do that, he says he will have to make his decision in the next 12 months.

► **Second-Generation Jets**—Sir Miles is being wooed publicly by three manufacturers, and a fourth almost certainly is waging a private campaign. All suitors are offering aircraft capable of handling up to 150 passengers, cruising at an estimated speed of Mach .9 over 4,000-mi. stages or crossing the Atlantic in from six to eight hours.

This second generation of British civil jets would be comparable in capacity and range to the proposed first generation of U. S. jets.

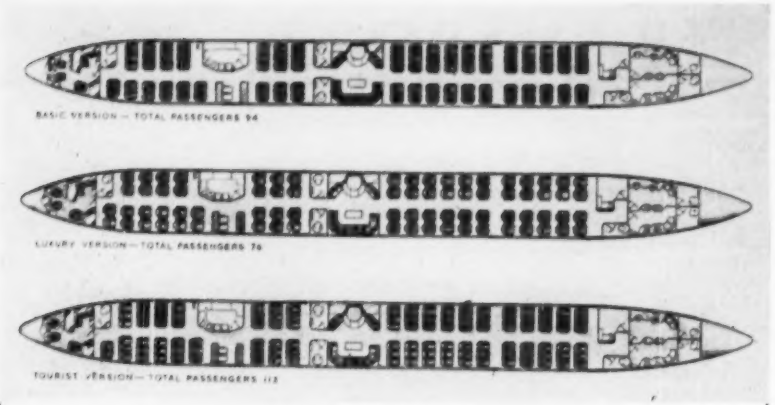
The suitors are:

• **Vickers-Armstrongs.** The VC-7 will be a civil version of the Vickers 1000 military transport, prototype of which has been ordered by Royal Air Force Transport Command. The 1000 will be powered by four Rolls-Royce Conway by-pass jets, but this engine is by no means certain for the VC-7. The Vickers 1000 probably will be flying by 1957.



VICKERS VC-7, similar to Vickers 1000 RAF transport (model shown), will probably be flying by 1957. It is another Comet 3 replacement possibility.

• **A. V. Roe, Ltd.** The Avro Atlantic is a civil version of the delta-wing four-jet Vulcan bomber. The Atlantic's proposed delta wing is somewhat larger than that of the Vulcan; the fuselage completely redesigned. Avro claims the transport will operate the North Atlantic for between 10 and 12 cents a long ton/statute mile. Design is capable of accommodating the largest known British engine—the Conway—or the Bristol Olympus pure jet, four of which



Avro Atlantic Jet Transport

Specifications

Span	121 ft.
Length	145 ft.
Fuselage diameter	12.5 ft.
Gross takeoff weight	approx. 200,000 lb.
Payload	20,000-45,000 lb.
Cruise speed	600 mph. plus
Cruise altitude	40,000 ft. plus
Minimum runway length	ICAO Class C
Minimum runway strength	ICAO Class 4
Pressure differential	8.8 lb./sq. in.
Rate of air change	2 lb./min./passenger
Forward cabin capacity	1,550 cu. ft.
Center cabin	1,000 cu. ft.
Rear cabin	3,340 cu. ft.
Forward baggage, freight hold	1,260 cu. ft.
Rear baggage, freight hold	670 cu. ft.

General Description

• **Structure.** Stressed skin fuselage in four main units, nose section to contain flight deck, front center section, center section and the rear section. Fuselage center section will be built integrally with center wing section's torsion box structure embracing the center and rear spars extending to the transport joint outboard of the landing gear bay. Center section of the front spar, jointed at the fuselage sides, is to be integral with the fuselage's front center section. All spar members will pass through the fuselage below the main floor. The fin is to be built as a separate unit. Anti-icing provisions will be included in the leading edges of the wings and fin.

• **Flying controls.** Rudder, elevators and ailerons will be aerodynamically balanced and sealed at the leading edges to the fixed structure. All flying control surfaces will be operated by duplicated irreversible electro-hydraulic power units. Artificial feel units are to be adjusted to give the correct degree of force.

• **Landing gear.** Each of the two main wheel units will have a multi-wheel bogie and single shock absorbing strut. The hydraulic braking system will incorporate Maxaret units permitting full braking power to be applied without wheels locking.

• **Engine installation.** Four engines, installed in pairs at each wing root in fireproof compartments which will enable them to be fully accessible from beneath the plane.

• **Fuel system.** All fuel to be carried in flexible tanks in the wing sections outboard of the engines and normally the fuel on one side of the plane will be used by the engines on that side, although any engine can be supplied from any tank. Fueling points will be in each main wheelwell.

• **Seating.** Basic version will carry 94 passengers in three compartments, 24 forward, 15 in center and 55 in rear section. Seats will face rearward and be pitched 42 in. There will be three seats on one side, two on the other. If bar is omitted, 109 seats can be fitted. Alternative accommodations for 11 individual berths in the rear compartment. Luxury version layout similar to basic type except that there will be four seats per row with more luxurious individual chairs. Compartments from front to rear will seat 20, 12 and 44 respectively, total increased to 88 passengers minus bar. Bunks for 11. Tourist layout provides six seats per row with each compartment, from front to rear, holding 29, 18 and 66 passengers. Increase to 131 if bar is omitted. Provision for bunks, but fitting them would be optional. Floors are designed to handle distributed loads of 75 lb./sq. ft.

power the Vulcan. An order placed now, says Avro chairman Sir Roy Dobson, make possible delivery of the Atlantic in 1958.

• **Handley Page.** The H.P. 97: civil version of the crescent-wing four-jet Handley Page Victor bomber. Sir Frederick Handley Page claims his aircraft will fly the North Atlantic at 1.2 cents per passenger mile, or equivalent to the figures quoted by Avro. The H.P. 97 features a double-deck fuselage on the style of Boeing's Stratocruiser; engines may be Bristol Olympus. Like the Atlantic and the VC-7, the H.P. 97 is just a design and a table model now.

• **De Havilland.** The Comet builders are, so far, courting BOAC only in private. Rumors about a Comet 4 abound, but there is no substance to them yet. Chances are de Havilland's next design will be entirely different—even to designation.

▶ **Production Financing**—What is significant to U. S. aviation in all of this is the high probability that only one of these ventures will be built. No one here conceives of building a large civil jet transport as a private venture. And with the shades of the abortive Brabazon and Princess ventures still hanging over them, it is too much to expect the accommodating Ministry of Supply to finance all four.

Avro's Dobson, for one, says he won't consider a government offer to finance one or two prototypes unless there is a production order for approximately 10 aircraft in the offing.

Therefore, BOAC's chairman holds the fate of all four projects in his hand. Sir Miles admits the Ministry of Supply will support the project favored by BOAC.

As for the others, he hopes that "some commonwealth airline" will undertake to sponsor them.

▶ **Gambling Britain's Lead**—Vickers, with an order for a military jet transport in hand, probably has the inside track with its VC-7 right now. In addition, Peter Masefield of British European Airways is intrigued with the idea of using high-density VC-7s on stage lengths of 400-500 mi. He thinks he can make them pay.

But before 12 months are out, the competition is likely to be very rugged, because it will be based not on flying prototypes but on designs. Sir Miles warns that "fractions of a penny in operating costs may decide the issue."

If it turns out that only one venture is developed, BOAC will be in the position of gambling all of Britain's present lead in the civil jet field on one aircraft.

Meanwhile, U. S. manufacturers have been reported working on designs for at least three jet transports for the North Atlantic.

T. H. "Monty" Montgomery, National Aero Sales Corp., Midway Airport, Chicago, Ill.

B. G. Vandre, Van's Air Service, Municipal Airport, St. Cloud, Minnesota.

H. Warren Halladay, Stonnell and Halladay, Washington, National Airport, Washington, D. C.

C. W. "Wayne" Crussell, Southern Aero, Inc., Municipal Airport, Atlanta, Georgia.

Don Pennington, Carolina Aero Company, Municipal Airport, Asheville, North Carolina.

Don Hood, Air Sales and Service Company, Wier Cook Municipal Airport, Indianapolis, Indiana.

Art Meurer, Arthur Meurer Co., Inc., LaGuardia Field, New York, N. Y.

George Harte, Harte Flying Service Municipal Airport, Wichita, Kansas.

H. Leibee Wheeler, Buffalo Aeronautical Corporation, Buffalo Municipal Airport, Buffalo, New York.

J. K. "Johnny" Hamp, Aero Sales Division, Houston Transportation Co., Municipal Airport, Houston, Texas.

Fred Smith, Sales Manager, AiResearch Aviation Service Co., 5907 W. Imperial Highway, Los Angeles 45, California.

H. William "Bill" Blake, Sales Manager, Washington Aircraft and Transport, Boeing Field, Seattle, Washington.

Cy Willock, Sales Manager, Dowtown Air-Park, Inc., 1800 South Western, Oklahoma City, Oklahoma.

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EAL-Colonial

- **Examiner urges CAB to okay voluntary merger.**
- **Also sees benefits in NWA-NAL combination.**

Civil Aeronautics Board approval of the Eastern-Colonial Airline merger contract is urged by CAB examiner Edward T. Stodola.

Stodola found that while Eastern acquired control of Colonial in violation of Section 408 of the Civil Aeronautics Act, the latter airline's decision to accept the EAL bid was "sound judgment."

He adds that National Airlines, which the Board has favored to merge with Colonial, would do better by combining with Northwest Orient Airlines from the standpoint of enlarging its north-south traffic market.

While the Board expressed preference for a National-Colonial merger over the Eastern-Colonial, Stodola says either combination would be in the public interest, but the Board should approve the voluntary agreement of Eastern and Colonial.

▶ **Conclusions**—Here are major conclusions in the order presented in Stodola's 150-page report:

• **Colonial stock purchases** through Smith, Barney & Co., by various Eastern directors and other firms and persons "closely affiliated with the carrier (Eastern)" gave EAL "such power and authority" as to constitute control within the meaning of the law."

• **Colonial management** appears to have examined "all the proposals" submitted by Eastern and National, exercised "sound judgment in accepting the Eastern bid."

• **Laurance S. Rockefeller,** an Eastern director, conceivably might have had technical interlocking directorship, "but the record is absolutely barren of any evidence in support of possible understandings or agreements between Rockefeller and any other acquirer of Colonial stock with respect to either the purchase of such stock or the voting thereof."

• **Eastern or National merger** with Colonial would unite complementary route systems, and "both combinations would meet the Board's well-established tests of integration. . . ."

• **Eastern's purchase** would not create a "monopoly" destructive of competition in the area affected. EAL and Colonial compete on only one 30-mi. segment (Washington-Baltimore).

• **National loses little business** through a merger, the examiner contends. National traffic from interline connections with Colonial "has amounted to less than one-half of 1% of the principal Eastern-National competitively served markets."

The examiner says "apart from the small volume of National-Colonial interline traffic and such small advantages from the so-called "beyond terminal traffic" north of New York and Washington, there is no reason to conclude that an Eastern and Colonial combination will significantly affect the present competitive balance between Eastern and National."

• **Eastern's size** "will not be appreciably increased relative to National," and even if it did, National "has maintained that Eastern's size is not a factor in National's ability to compete with Eastern. . . ."

• **Eastern's price is reasonable,** the examiner says. Market equivalent of Eastern's share-exchange offer was $15.75 per share of Colonial, and National's was $14.77. Colonial stock sold around $11.87 at the time. Stodola says that "to disapprove the stock exchange formula . . . is to say that an experienced and hard-headed business management abused its managerial discretion in deciding to pay approximately $4 million for (Colonial's) intangible assets."

He concludes that "few, if any, mergers would ever be concluded if the price were never allowed to be greater than the cost of the bare bones of the carrier sought to be acquired."

Convair Tells Tobey It Likes Turboprops

Consolidated Vultee Aircraft Corp. favors turboprops and does not expect to produce a jet transport for at least next five or six years, president Joseph T. McNarney last week wrote Sen. Charles W. Tobey, Chairman of the Senate Committee on Interstate and Foreign Commerce.

Gen. McNarney, (USAF Ret.) expressing his company's philosophy on jet transport planning in reply to an industry-wide poll by Senator Tobey, Convair's president said his company favors turboprop transports as the next logical development, ahead of jet-powered transports, because of fuel economy and capabilities of both low-altitude short-range operation and long-range operation.

▶ **Advantages**—Turboprop planes will take shorter runways, will be quieter around airports, will have speed for commercial use comparing favorably with jet speeds, and will be easier to get CAA certification for, he said.

The Convair chief executive thinks government support for transport plane development should come from the Defense Department in the form of a requirement for aerial transportation of men and supplies for military use and for planes capable of handling this transportation.

Currently the only way adequate air logistics can be provided for D-day operations of Strategic Air Command and Air Defense Command, McNarney says, is by almost complete commandeering of commercial aviation, stripping the aircraft needed for defense industry support operations after D-day.

▶ **His Arguments**—McNarney cited the Harvard and other studies on air transport indicating that airlift for military equipment abroad is more economical than ship, rail or truck.

He called the military development of an air logistics system and the aircraft for it a justifiable way in which American industry can be financed, "or subsidized, if you will to compete with the British commercial jet industry."

▶ **Other Comments**—Here are some other industry replies to the Tobey poll on jet transport development:

• **George Bunker,** president of Glenn L. Martin Co., reported that, with present tax rates, manufacturers cannot finance the development and "undoubtedly some form of government financing seems necessary." He added that even if the manufacturers were able to put up the development cost, it could not be amortized because the market is not great enough. He pointed out that Martin sold only 100 4-0-4s, losing $20 million on the project.

• **William Allen,** president of Boeing Airplane Co., said the development cost on the jet transport prototype which his firm has been working on for the past year and expects to fly in the fall of next year, will be between $15 and $20 million. He stated he hopes the government "either through legislation or procurement will recognize the importance to the national welfare of the development of jet transport aircraft."

• **Ralph Damon,** Trans World Airlines president, supported government assistance on jet development, but suggested a preferable approach would be for the committee to instruct Civil Aeronautics Board to allow airlines sufficient profit to enable them "to supply manufacturers with funds for the development, testing and production."

"CAB," he objected, "has displayed a tendency to restrict earnings in periods of better business without allowing opportunity to recoup for losses in other periods." He said TWA will be in the market for jets "as soon as economical units are available" and added: "None of the British jets yet produced offers possibilities of economical operation at present rate and fair levels. The American manufacturers should be able to overcome the British lead if they produce an efficient airplane in the near future."

CAB Names Sawyer Executive Director

Civil Aeronautics Board last week appointed a Republican executive director, Raymond Sawyer, to succeed James Verner, Democrat, who resigned last month.

Sawyer has been attorney-adviser on civil aviation and legislation for the Secretary of the Air Force since Jan. 1, 1951. He is 43.

The CAB executive directorship is an administrative job, but also carries responsibilities in policy interpretation and emphasis, as well as staff hiring and firing.

Sawyer obtained congressional and White House support for his appointment. He reports he has been a lifelong Republican from Plymouth, N.H. Washington and New Hampshire friends say his views are liberal. He has been active in a wide variety of public and business affairs since graduating from University of New Hampshire and University of Colorado Law School and Harvard Law School.

▶ **Sawyer's Career**—He listed his background:

• **Aviation.** In Air Force service 1942-45, he was with AAF headquarters as operations officer of the Transport Division and executive assistant to the chief of the glider program. With 20th AAF, he was Chief of Personnel and Supply, Operations Division. In 1945, he was released to inactive duty as a major.

In his job as attorney-adviser to Secretary of the Air Force on civil aviation and legislation, he also was USAF legal representative to Air Coordinating Committee, liaison to CAB on joint use of airports, and participant in legal arrangements for the airlines' civil reserve air fleet.

He was assistant chief counsel to the Air Safety Board of the Civil Aeronautics Authority 1938-39.

CAB Boosts NCA's Temporary Mail Pay

A North Central Airlines temporary mail pay increase of $70,000 to break even for the period June 14, 1951, to Mar. 31 of this year has been proposed by Civil Aeronautics Board in a CAB show-cause order.

The Board order also set a new current and future rate estimated to yield about $12,569 more per year.

The new rate of 50 cents per plane-mile may yield about $2,228,963 a year from last Apr. 1 forward. The $70,000 increase for the back period brings total pay for the two years up to Apr. 1 to $2,979,740 or a rate of about 62 cents a mile.

CAB accepted North Central's esti-

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In 1930 Standard Airlines was acquired from Western Air Express. During 1932 Century Airlines and Century Pacific Lines were added and in 1934 coincident with the formation of American Airlines, C. R. Smith became president of the new company.

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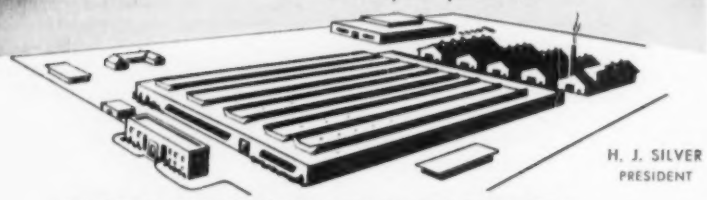

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PRESIDENT

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mates of mail-pay need, except for $118,013 for past maintenance expense and $30 per operating hour for future excess mileage and aircraft maintenance expense.

Board Suspends AA, EAL Shorthaul Rates

Civil Aeronautics Board has decided to prohibit American and Eastern Air Lines practice of charging more than 4.5 to 5 cents a mile on shorthaul segments of their coach flights. But CAB must hold hearings in an investigation procedure before forcing a fare cut.

Washington observers expect a final order requiring tourist fares on all parts of coach flights by early fall of this year.

CAB suspended American tariffs of 5.5 to 6 cents a mile on shorthaul segments New York to Washington and Boston and Buffalo to Boston and Chicago.

The Board temporarily barred Eastern's Boston-Miami coach tariff because of similar non-coach rates proposed between Boston, New York and Washington.

▶ **What CAB Wants**—Result is that Boston and Buffalo are without coach fares on some major long routes as well as shorthaul routes pending the CAB investigation.

The Board is investigating American and EAL practice of charging first-class rates on intermediate segments of coach flights as possibly "unjust or unreasonable, unjustly discriminatory, or unduly preferential or prejudicial."

CAB did not suspend AA's Boston-Chicago-Los Angeles coach fare because United Air Lines and Trans World Airlines offer competitive coach service along that route.

UAL and TWA rates on intermediate segments are about 4½ cents, maximum allowed by the Board's fare policy of two years ago, plus $1-a-ticket increase granted the airlines one year ago.

CAB ORDERS

(June 11-14)

American Airlines coach fares suspended (see above).

Texas local service order changed to consider route patterns of Delta-C & S Air Lines and Trans-Texas Airways to Dallas, Tyler and Longview, Tex., and Shreveport, La.

Pan American World Airways permitted to suspend service to Barcelona, Venezuela, on its Maturin-Caracas run.

Central, Braniff and Continental brought into the Board's investigation of Ozark Airlines service to cities between Tulsa and Kansas City.

Northwest Orient Airlines director, Albert J. Weatherhead, Jr., interlocking relationship as president of the Weatherhead Co., approved. NWA director Wheelock Whitney's interlocking relationship as director of nine other companies also approved.

Allegheny Airlines continued suspension of service to Stroudsburg, Pa., approved until airport facilities improve.

North Central Airlines temporary mail rate increased.

California Central Airlines purchase of five Martin 2-0-2s from Airline Transport Carriers approved, with CCA owing $925,000 of balance to ATC. Charles and Edna Sherman's common control of ATC, a nonsked, and California Central, scheduled intrastate line, was approved formally by CAB a year ago.

National Airlines common Miami coach fare to Philadelphia and New York withdrawn by NAL. CAB therefore dropped its suspension and investigation.

Philippine Air Lines San Francisco-Mexico City foreign air carrier permit granted in accordance with terms of U. S. bilateral air agreement.

American's move to broaden the Flying Tiger-Slick Airways merger case denied. (See p. 18.)

Mohawk Airlines granted permission to start serving Bradford-McKean County Airport, Pa.

Northeast Airlines final mail rate fixed to yield estimated $1,734,679 a year proposed in show-cause order last month (AVIATION WEEK May 25, p. 102). Airline denied request that CAB withdraw language critical of its high maintenance cost and alleged slow motion toward merger. Final Board order includes plane-mile mail rate for operation of Curtiss C-46.

Flight Engineers' International Assn., PAA chapter, granted request for further stay of CAB seniority order on integration of merged American Overseas Airways personnel. Court upheld Board's right to fix terms of employe integration in mergers. Pan American already has followed CAB terms.

Allegheny Airlines granted change in new certificate to make Cumberland, Md., an alternate point with Altoona, Pa., saving an estimated $30,000 a year. Cumberland is not equipped for night operation. Routing required by the original certificate renewal by CAB last month would have hampered scheduling flexibility.

Sourdough Air Transport route petition in the Seattle-Alaska route case dismissed on request of the company.

Leavens Brothers Air Services, Ltd., granted three-year foreign air carrier permit for irregular flights between Canada and U. S.

Overseas National Airways application for San Francisco-Honolulu-Guam-Tokyo-Korea all-cargo route dismissed from trans-Pacific route case at request of the company.

American Flyers Airline, Capitol Airways, Johnson Flying Service and Standard Airways individual nonsked exemptions changed to prohibit them explicitly from doing business under any other name.

Central Airlines denied exemption to serve Muskogee, Okla., and Little Rock, Ark.

City of Oakland granted right to intervene in trans-Pacific and West Coast-Hawaii route cases. Honolulu Chamber of Commerce permitted to enter the West Coast-Hawaii case.

SHORTLINES

► **Aerolineas Argentinas** started Buenos Aires service to Concepcion, Paraguay, on 48-seat Sandringham flying boats, taking seven hours for the flight via Corrientes, Argentina and Asuncion.

► **Air Traffic Conference** reservations committee helped 10 airlines serving Chicago to work out an interline teletype, eliminating time-consuming, recordless phone system relied upon generally for interline reservations. System starts operation July 15.

► **Boise Municipal Airport** (Idaho) runways will be extended to 10,000 ft. as part of a program to develop it as Air National Guard training center for western states.

► **Eastern Air Lines** reportedly approached Guatemala Ministry of Foreign Affairs in Washington recently seeking permission to operate within the Central American Republic. KLM Royal Dutch Airlines and Aerolineas Argentinas already have asked Guatemala for operating permits.

► **Japan Air Lines** flew 102,893 passengers on its six DC-4s in 1952.

► **Pan American World Airways** reports Colombia has joined the growing list of Latin American nations cutting red tape for tourist entry. Other countries now granting free tourist cards instead of passports and visas are Nicaragua, Bahamas, Jamaica, Cuba, Costa Rica and Argentina.

► **Yugoslav Air Lines** has started Belgrade-Istanbul service twice a week.

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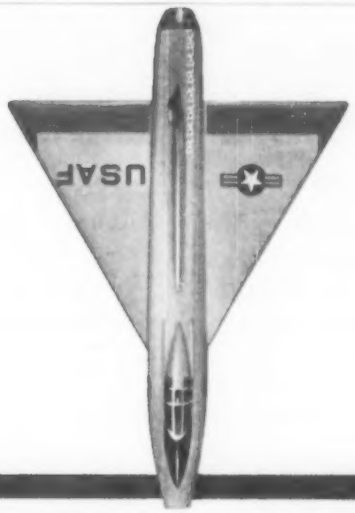

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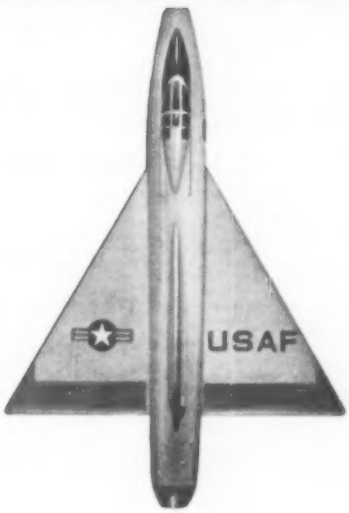

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52	10078-1AG	Eclipse	Gyro Indicator
69	CQ-9	Eclipse	Clutch Switch (PB10)
11	19086-1C	Eclipse	Amplifier
19	15100-1B-A1	Eclipse	Pitch Trim Gauge
8	20000-43A-13A1	Eclipse	Magnesyn Transmitter
67	23000-2A	Eclipse	Magnesyn Indicator
15	22101-11-A4	Eclipse	Pressure Trans.
6	2226-11C-3A	Eclipse	Dual Tach.
9	20100-42B-14A2	Eclipse	Torque Ind.
9	20000-8A-14	Eclipse	Magnesyn Pos. Ind.
23	20100-11C-4-A1	Eclipse	Wing Flap Indicator
11	DW-33	Eclipse	Transformer
23	CQ-2	Eclipse	Switch Box
75	1195-4-A	Eclipse	Vibrator
80	DW-28	Eclipse	Transformer
11	2227-11-D3A	Eclipse	Tachometer
75	1416-12E	Eclipse	Starter
100	716-3A	Eclipse	Generator (NEA-3A)
384	564-2A	Eclipse	Oil Separator
71	828TY13Z2	Weston	Oil Temp. Indicator
40	119862	Weston	Carb. Air Temp. Indicator
400	AN5780-2	Weston	Wheel & Flap Position Indicator
1000	AN5780-2	G.E.	Wheel & Flap Position Indicator
40	828TY12Z2	Weston	Dual Carb. Temp. Gauge
11	727TY70Z2	Weston	Air Temp. Ind.
85	727TY79Z2	Weston	Air Temp. Gauge
88	727TY73Z2	Weston	Air Temp. Gauge
83	727TY74Z2	Weston	Air Temp. Gauge
10	728-40Z2	Weston	Air Temp. Gauge
21	8DJ29AAY	G.E.	Cowl Flap Ind.
22	77C5	Lewis	Carb. Air Temp.
16	76B19	Lewis	Cyl. Head Temp.
23	77C3	Lewis	Oil Temp. Gauge
13	77C4	Lewis	Oil Temp. Ind.
30	47B21	Lewis	Free Air Temp.
33	47B22	Lewis	Air Temp. Gauge
28	47B23	Lewis	Air Temp. Gauge
54	47B24	Lewis	Air Temp. Gauge
22	906-6-011	Kollsman	Diff. Press. Gauge
48	254BK-6-052	Kollsman	Diff. Press. Gauge
33	DW-47	Eclipse	Transformer
46	117-47	Edison	Fire Detector
19	117-10	Edison	Control Box
200	981280	Kidde	CO2 Cylinders
43	966090	Kidde	Interconnector
104	966679	Kidde	Pressure Control
225	981591	Kidde	Tee
151	A-4614	Kidde	Switch
47	M8700368	Kidde	CO2 Cyl.
74	923748	Kidde	Oxygen Cyl.
326	982585	Kidde	Valve
325	AN60009-1B	Oh. Chem.	Valve
247	AN6009-2A	Oh. Chem.	Valve
47	2-1046-76	Parker	Valve (3000 PSI)
115	P4CA2A	Parker	Primer
68	SP4-2746-77	Parker	Restrictor Valve
105	SP4-2746-78	Parker	Restrictor Valve
68	6-746-10	Parker	Valve
40	SP4-2746-79	Parker	Restrictor Valve
48	SP-2746-80	Parker	Restrictor Valve
60	SP4-2746-81	Parker	Restrictor Valve
127	PL2-2546-75	Parker	Cone Check Valve
123	PL2-2546-76	Parker	Cone Check Valve
620	PL2-2546-77	Parker	Cone Check Valve
540	PL2-2546-78	Parker	Cone Check Valve
142	SP4-2746-76	Parker	Restrictor Valve
112	PLY-843-54	Parker	Check Valve
23	PL2-1846-77	Parker	Check Valve
120	MF9-713-15A	Vickers	Hydraulic Pump
124	PF12-713-25BCE	Vickers	Hydraulic Pump
10	PF9-2713-20Z2	Vickers	Hydraulic Pump
327	PF4-713-20BCE	Vickers	Hydraulic Pump
57	MF45-3911-20Z	Vickers	Hydraulic Pump (3000 PSI)
28	AA31400	Vickers	Valve
125	D7818	Adel	Anti-Icer Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
45	AN4103-2	Clifford	Brass (Valve #U4785) Oil Cooler
70	AN3213-1	Scintilla	Ignition Switch
250	A-9 (94-3226)	Nesco	Ignition Switch
66	M862A	Jos. Pollack	Master Switch
148	PG20BAS1	Honeywell	Switch Air Ram.
40	PG20BAS7	Honeywell	Air Ram Switch
18	4582-A4A-6C Eng.	Dynamic Air	Blower
24	U-702-15	Joy Mfg. Co.	Blower
20	V301B7	Aerotec	Pressure Relief Valve
419	450	Skinner	Filter
287	1033-4E1	White-Rodgers	Heater Control Switch
196	17322-2	Fenwall	Thermo Switch
34	9804B	Vapor Car Heating Co.	Control Box
25	46B311	Vapor Car Heating Co.	Compensator
202	A812	Interstate Aircraft & Eng. Co.	Solenoid
46	146102	Bendix	Valve (0-500 PSI)
240	1965-900	Airex	Relief Valve
29	HC2109	Air Associates	Hyd. Cylinder
8	HC2110	Air Associates	Hyd. Cylinder
53	AN6203-3	Bendix	Accumulator10°-1500 P.S.I.
90	JH950-R	Jack & Heinz	Starter Motor
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Coleman	Control
230	921-B	Stewart-Warner	Heater (200000 BTU)
22	0655-D	Aro	Oxygen Regulator
65	ASDC2	CO2 Mfg. Co.	Fire Detector
97	6041-H-146A	Cutler Hammer	Relay (B-12)
237	6141-H69A	Cutler Hammer	Circuit Breaker
47	7964-404	Leach	Relay
22	M-2031	Air Associates	Actuator
11	FYLD2516	Barber-Coleman	Thermostat
51	AYLZ2284	Barber-Coleman	Micropositioner
20	72400	Ham. Stand.	Prop. Reversing Control
10	5X18	Woodward	Governor
46	A14-A-970BP	Westinghouse	Contractor
26	70G3	G.E.	Transformer
718	B9A	Square D	Relay
6	83A9	Surface Combustion Co.	Heater
115	C6363-1-5A	Spencer	Circuit Breaker
115	C6363-1-2A	Spencer	Circuit Breaker
33	18784	Adel	Restrictor Valve
1700	AM1614-80	Heinemann	Circuit Breaker
31	BO8X-2	Allied	Relay
85	12924-2	Adel	Lock Valve
805	58G926	G.E.	Ballast Core & Coil
140	58G946	G.E.	Ballast
40	7210-24	Leach	Relay
66	25432	Airesearch	Flex. Cable
518	MT48C	Bendix Radio	Insulator
20	M-101-B	Aerotec	Pressure Switch
12	MT68EG	Bendix Radio	Mount
52	715E	Fulton Syphon	Temp. Control
478	D9530	Adel	Selector Valve
658	D9530-2	Adel	Selector Valve
428	D9560-2	Adel	Selector Valve
179	D9639	Adel	Selector Valve
237	D9696	Adel	Selector Valve
1744	D10044	Adel	Selector Valve
244	D10051	Adel	Selector Valve
814	74947 (TY, PH3)	Aero Supply	Valve
335	AN5830-1	Whittaker	Valve
74	AN5830-6	Whittaker	Valve
60	AN5831-1	Parker	Valve
130	612-4A	Eclipse	Valve
2200	37D6210 (AN4078-1)	United	Solenoid Valve
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775	AN3096-5	Grimes	Dome Light
1365	AN3096-6	Grimes	Dome Light
6	610-2C	Eclipse	Vacuum Pump
550	PD12K10	Stromberg	Carburetor
236	PR48-A1	Stromberg	Carburetor
90	1685-HAR	Holley	Carburetor
19	1375F	Holley	Carburetor
407	SF9-LN-2	Scintilla	Magneto
185000	LS4-AD1	Aero	Spark Plug
1	R1820-52	Wright	Engine
16	R1820-54	Wright	Engine
4	R1820-60	Wright	Engine
1	R1830-43	P & W	Engine
166	1045A	P & W	Bearing
500	3506	P & W	Flange
130	8988	P & W	Follower Ass'y.
814	35814	P & W	Blower Ass'y.
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75	48363	P & W	Shaft
56	48392	P & W	Sump
390	48461	P & W	Gear
78	76236	P & W	Gear
1178	84289	P & W	Bearing
113	84487	P & W	Housing
77	84591C	P & W	Nose Housing
200	48350-D	P & W	Crankcase Ass'y.
200	84083	P & W	Cylinder
100	84084	P & W	Cylinder
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281	CR2791-G100-K4	G.E.	Relay
626	CR2792F101-A3	G.E.	Relay
41	G34464	Guardian	Relay
350	G31502-A	Guardian	Relay
22	146102	Vickers	Brake Valve
9	557-5	Eclipse	Check Valve
107	D12296	Adel	Pump
67	19100-2-101B	Kenyon	Check Valve
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32	3V-217-HC	Pesco	Separator
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18273	AN200-K3L2	Fafnir	Bearing
245	LMR-4	Micro	Switch
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111	5AM31NJ10	G.E.	Amplidyne
425	5BA40NJ1A	G.E.	Motor
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25790	NR6L12	Torrington	Bearing
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45	D8060	C. P. Clare	Relay
298	727-TY37P	Weston	Air Temp. Ind.
2000	H909-K99	C. H.	Switch
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50	AN6213-2	Bendix	Hyd. Valve
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27	AN6247-2	Adel	Hyd. Valve
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1175	MS-2	Mallory	Selector Box
172	A7012	Delco	Motor
6	8DJ13ABK	G.E.	Tachometer Indicator
200	2222-1F-2A	Eclipse	Tachometer Indicator
28	AN5770-2	Manning Maxwell Moore	Manifold Pressure Gauge
71	1003-4	Eclipse	Generator
427	NAF1016-1	Adams & Westlake	Light Ass'y.
616	NAF1016-2	Adams & Westlake	Light Ass'y.
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COCKPIT VIEWPOINT

By Capt. R. C. Robson

United's Airborne Radar

This year, which may eventually become known as the year of the black funnel, has already produced more than its fair share of tornadoes and thunderstorms. Fortunately there have been few total aviation disasters—like the National DC-6 in the Gulf of Mexico—resulting from in flight contact with these storms.

This low fatality score however, belies the importance of severe storms; there have been numerous cracked wing spars, considerable hail damage, disruption of schedules and many wild rides which caused more than one passenger to swear off flying.

When the first pressurized transports appeared it was popular to bill them as "above the weather" vehicles. The folly of this is now evident. The increase in flying, in cruising altitude and cruising speed has resulted in more violent weather being encountered than ever before and the end is not yet in sight. At present the only answer to avoidance is observance; in aviation this means radar.

▶ **Is Ground Radar the Answer?**—Recently some use has been made of ground radar, both military and civil, as an aid to weather flying. In fact some have called it the answer. Well, it is good but the danger in relying on ground installations to see us through is that they can provide guidance to only a few airplanes at a time. If the practice becomes widespread there will be diminishing returns and a given flight may not be able to get help when needed.

As this article is being written United Air Lines should be engaged in service testing the best answer yet—the first airborne radar built to airline specifications. A DC-3 will operate, mainly out of Denver, this summer in search of thunderstorms so that pilots and other operating personnel can evaluate the effectiveness of the new radar in producing safe, smooth flights.

This radar is not, of course, the exclusive development of UAL. It is the result of many years work by many people and a final push by a joint airlines committee. This radar group decided—rightly—that the display of dangerous weather was the most important requirement of radar. Some of the specs include: provision that thunderstorms show up at a clear air range of 100 miles, that rainfall rate contours be displayed, that a means be provided to allow pilots to differentiate between terrain and weather, and that the display tube be bright enough to obviate the need for hoods or dark rooms.

▶ **No Jack-of-All-Trades**—As has been pointed out before, airborne radar offers practically no solution to mid-air collisions. The difficulty in providing spherical coverage, of displaying only those aircraft on a collision course and many others make the device almost useless here. Also, as an aid to navigation—while of limited usefulness—there is no reason to think of radar as becoming a primary navigation aid or that it will in any way replace present, more precise, VHF ranges. Airborne radar cannot be a jack-of-all-trades. Taking first things first, it was designed for dangerous weather avoidance.

When it is considered that modern transports represent an investment of several million dollars per plane it can only be wondered why weather radar has been so long in appearing.

We will hazard several guesses as to the future:

- One is that United pilots will be well satisfied with the new radar.
- Another is that United will order this equipment installed in its DC-7s to be delivered next year.
- A third guess is that it won't take the passengers long to learn that a radar ride is a better ride and they will clamor for those tickets.

AVIATION CALENDAR

June 22-July 3—Special summer program presenting a formalized theory for analysis and synthesis of feedback control systems and classes July 6-17 in advanced strength of materials, Massachusetts Institute of Technology, Cambridge.

June 29-July 2—Semi-annual meeting, American Society of Mechanical Engineers, Hotel Statler, Los Angeles.

July 1-3—Annual meeting of University Aviation Assn., National College of Education, Evanston, Ill.

July 3-7—Seventh All-Women Transcontinental Air Race from Lawrence, Mass., to Long Beach, Calif.

July 4-5—Dedication of Coles County Airport, Mattoon, Ill.

July 7-16—20th national soaring contest, Harris Hill, Elmira, N. Y. Categories include: men's national, women's national, championship club and A, B and C.

July 9-12—Sixth International Aviation Exposition, Detroit-Wayne Major Airport.

July 15-16—IAS Annual Summer Meeting, Honors Dinner, IAS Building, Los Angeles, Calif.

July 18-19—Air review commemorating 50th anniversary of powered flight and 25th anniversary of Eastern Air Lines, Akron-Canton (Ohio) airport.

Aug. 2—Amarillo, Tex., Jaycee Air Fair, observance of 50th anniversary of powered flight, Tradewind Airport.

Aug. 3-8—Fourth annual congress, International Astronomical Federation, Zurich.

Aug. 19-21—Western Electronic Show and Convention, San Francisco.

Aug. 19-24—Seventh International Model Plane Contest, sponsored by Plymouth Motor Corp., Selfridge AFB and Belle Isle, Detroit.

Aug. 25—Opening of the ninth legal committee meeting, International Civil Aviation Organization, Rio de Janeiro.

Sept. 5-7—National Aircraft Show and 50th anniversary of powered flight, Dayton (Ohio) Municipal Airport.

Sept. 7-13—1953 SBAC Coronation Year Flying Display, Farnborough, Hampshire.

Sept. 7-17—Fourth International Aeronautical Conference, joint meeting of RAeS and IAS, London.

Sept. 21-25—Eighth National Instrument Exhibit, Instrument Society of America, Sherman Hotel, Chicago.

Sept. 23-24—1953 meeting of Aircraft Spark Plug and Ignition Conference, Champion Spark Plug Co., Toledo.

Sept. 28-30—Ninth annual meeting, National Electronics Conference, Hotel Sherman, Chicago.

Sept. 29-Oct. 3—National Aeronautics Meeting, Aircraft Engineering Display and Aircraft Production Forum of the Society of Automotive Engineers, Hotel Statler, Los Angeles.

Sept. 30-Oct. 1—Aircraft electric equipment conference, American Institute of Electrical Engineers, Seattle.

Oct. 8-9—New England section meeting, Society of the Plastics Industry, Inc., Equinox House, Manchester, Vt.

Oct. 28-30—Annual convention of Southeastern Airport Managers' Assn., Marlin Beach Hotel, Ft. Lauderdale, Fla.

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BENDIX PRODUCTS DIV. BENDIX AVIATION CORP. ..... 3rd Cover
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Agency—George C. McNutt, Adv.

BINKS MFG. CO. 33
Agency—Robertson & Buckley, Inc.

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Agency—Burke Dowling Adams, Inc.

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Agency—G. M. Basford Co.

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Agency—Hixson & Jorgensen Adv., Inc.

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SEARCHLIGHT SECTION 97, 98, 99, 101, 101, 102, 103

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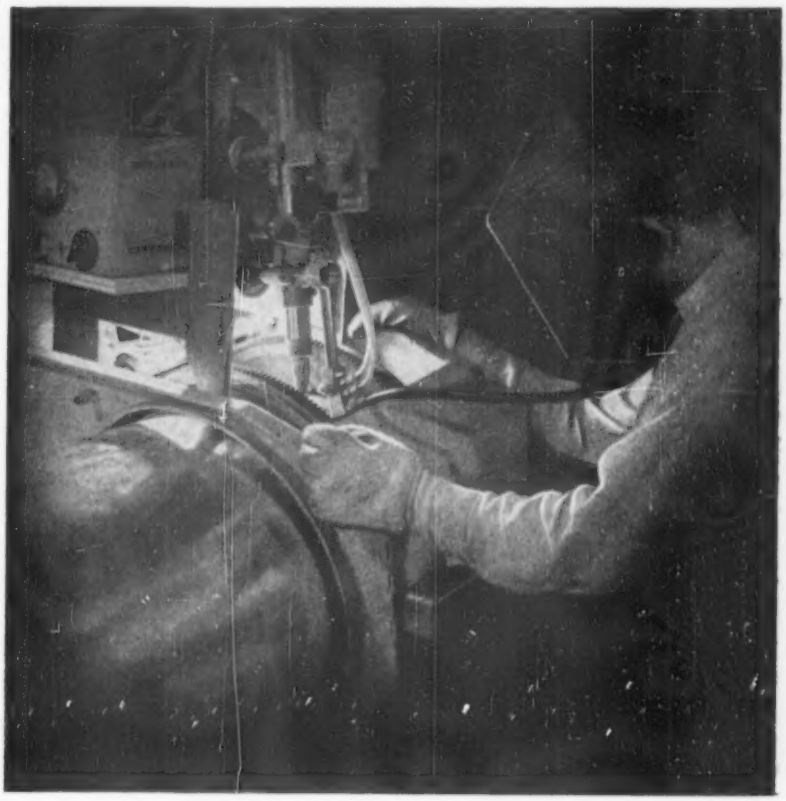

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LETTERS

SAE Coverage

I have been pleased to see the excellent reporting on Society of Automotive Engineers activities which has been appearing in AVIATION WEEK.

As you perhaps know, I have been closely interested for a number of years in the activities of the society. Over this period I have become well acquainted with the value of its various programs, and it is gratifying to have recognition by an outstanding publication such as yours.

I particularly would like to compliment you on your SAE editorial in the May 11 issue.

A. T. COLWELL, Vice President
Thompson Products, Inc.
23555 Euclid Ave.
Cleveland 17, Ohio

We are deeply grateful for the fine reportorial coverage AVIATION WEEK has been giving SAE meetings, papers, and technical committee work. It pleases us more than a little to find that your top-notch aeronautical business paper finds SAE events so newsworthy.

I was particularly pleased to read the comments in your editorial. Your suggestions for improving the information-swapping at the SAE Production Forum are well taken. You can be sure that we'll give them all serious consideration.

I would also like to commend your editors, who have been a pleasure to work with, Norm Shidle tells me. He is especially impressed with the performances of Irv Stone, Dave Anderton, and George Christian.

Here's hoping that the pleasant working relation between your staff and ours will long continue.

JOHN A. C. WARNER, General Manager
Society of Automotive Engineers, Inc.
29 W. 39th St.
New York 18, N. Y.

Story of 2 Kittens

With reference to your Apr. 27 issue, page 36—David A. Anderton's article, "Two Paths to Day Fighter Superiority":

I think Mr. Anderton had better check his story about the British Grain Kitten, the World War I fighter which, at a gross weight of only 520 lb., carried three hours fuel, a Lewis Gun, and a pilot.

Plenty of the single-seat machines of this era weighed around 1,200 lb., but I can find no record of a machine named the Kitten, nor of any fighter weighing as little as 520 lb. gross. Nor, again, can I find any record of the British Grain Company.

COLIN NICHOLSON, AFRAeS
916 West Washington Ave.
South Bend 16, Ind.

*(The Kitten was one of two types designed by the Royal Naval Air Service during World War I. One was built at Grain and the other at Eastchurch, thus giving the names of Grain Kitten and Eastchurch Kitten. They were designed to operate as scouts, based on destroyers. Horsepower was around 30. Grain's version had 18-ft. wingspan, and a maximum speed of 88 mph. in addition to the other characteristics I quoted. There is a picture of the Grain Kitten in Flight magazine for Nov. 7, 1952, on page 592, if Mr. Nicholson cares to look.—*DAVID ANDERTON)

Developing Executives

I have just read with great interest your editorial in AVIATION WEEK for Mar. 9, on the executive development program which has been started by Convair.

For more than a year, the university has been conducting a course in advance management for senior officers of the United States Air Force. By the end of this academic year, more than 1,100 of these senior officers, ranging in grade from lieutenant colonel through major general, will have graduated from this course. You will appreciate what this means in terms of both course level and impact on the national defense effort.

I am enclosing a copy of the curriculum of this program. You will notice that we have drawn material from all over American business. It seems to me that the activities of Convair might be of particular use and interest to these senior Air Force officers.

JOE L. JESSUP, Coordinator
Air Force Manpower Management
Training Program
George Washington University
Washington 6, D. C.

From Pioneer's Smith

I have been delayed in writing you to express my sincere thanks and appreciation for your splendid editorial in AVIATION WEEK ("A Blow to Local Service Lines").

I know I need not emphasize to you the ramifications and implications of the Board's decision as to Pioneer Air Lines and its effect on that segment of the air transport industry constituted by local service airlines.

For some 5 years the Board has more or less endorsed and supported legislation to provide for federal funds to be used in the development of a plane to replace the DC-3. I would never have supposed that the pursuit of this, until now at least, "will-o'-the-wisp" would completely foreclose the alternative consideration of trying to adapt something which is available, i.e., the Martin and Convair, to this increasingly serious problem.

It is painful to be doomed to mediocrity; it is more grievous to be the instrument required to impose that mediocrity upon the tens of thousands of the public who have made possible our growth in the past and who promised our success in the future.

Again, I am grateful to you for your consideration and for your obvious recognition that the significance of this decision goes far beyond its effect upon one member of a small industry.

ROBERT J. SMITH, President
Pioneer Air Lines, Inc.
3323 Grove St.
Dallas, Tex.

Hughes' New Ideas

Hoorah for Hughes and for AVIATION WEEK for the favorable mention you made May 25 of Hughes' innovations. The use of precision inspection gauges and instruments on the factory floor by machine tool operators is not widespread. By catching the first defective piece on the spot this system does not allow a pile of doubtful parts to accumulate at some remote inspection station to be sorted out.

How does Hughes convince the visiting quality-control expert that its operators actually are their own piece part inspectors, and that their low scrap figures are realistic? We were sold on this innovation during the war when we saw the system in operation at Hamilton Beach. We have followed this practice at Clifton now for over seven years and our visitors are still skeptical!

If reprints of this article are available, we would very much appreciate having two or three to circulate.

ARNOLD E. HAYES, Service Engineer
Clifton Precision Products Co.
Sycamore & Mill Rd.
Clifton Heights, Pa.

Lighting Up Planes

Your excellent correspondent, Capt. R. C. Robson, in AVIATION WEEK May 18, bemoans the confusion over exterior lighting of planes.

I ask, in all my humble ignorance, did the air transport industry ever try to make an airplane *look* like an airplane after dark by exterior floodlighting for complete visibility. Seems not too difficult to set rear-pointing floodlights on top and at bottom of front end of fuselage to bathe top and bottom of plane in flight and partly light the sides.

I think this could be done without blinding either pilots or passengers. The tail assembly would loom up like the proverbial brick house in a fog.

Things are getting tough when the flyboys mistake wing lights for landing lights and go climbing on top one another's backs.

H. W. RICHARDSON, Editor
Construction Methods and Equipment
McGraw-Hill Publishing Co.
330 W. 42nd St.
New York 36, N. Y.

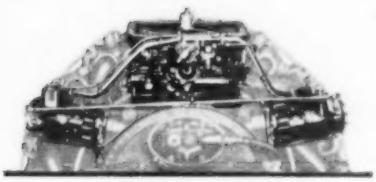
'Trade—Not Aid'

Commenting on your excellent editorial of May 25, concerning our $100,000 reward for an intact MiG-15 and the British protests thereof, could it not be that our staunch ally is simply peeved at having that sum diverted from their exchequer?

BURT R. DYAR
3415 Sherbourne Dr.
Culver City, Calif.

(Additional letters on p. 39)

A great new airliner sets new performance standards!



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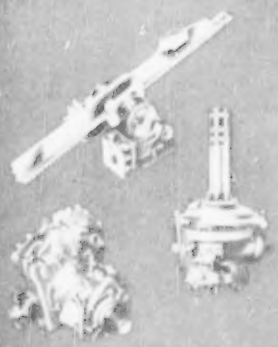

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